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Smelting Practice of the Tyee Copper Company

Fluid Slag and Clean Separation of Matte Obtained While Treating Heavy-spar Ores. Slags Contain up to 30 Per Cent. BaO

BY GEORGE W. MAYNARD*

Good metallurgical practice is not confined to our great smelting plants, as will be seen from the results obtained at the works of the Tyee company at Ladysmith, British Columbia. Since my visit to the works, over a year ago, important changes and additions have been made mainly for facilitating the delivery of ore and coke and the handling of material at the plant. W. J. Watson, the smeltery manager, has very kindly furnished me the data of the late improvements and has also permitted me to publish the analyses of the smelting products made previous to and at the time of my visit.

TYEE SMELTERY, LADYSMITH, BRITISH COLUMBIA

The smelting works of the Tyee Copper Company, Ltd., are situated on Oyster harbor, an inlet of the Gulf of Georgia, on the eastern coast of Vancouver island, and are adjacent to the town of Ladysmith. Ore can be received either by sea or by rail but the bulk of the material smelted is delivered by water, the company's wharf being situated about half a mile further up Oyster harbor than the wharf and bunkers of the Wellington Colliery Company.

*Mining and metallurgical engineer, 20 Nassau street, New York.

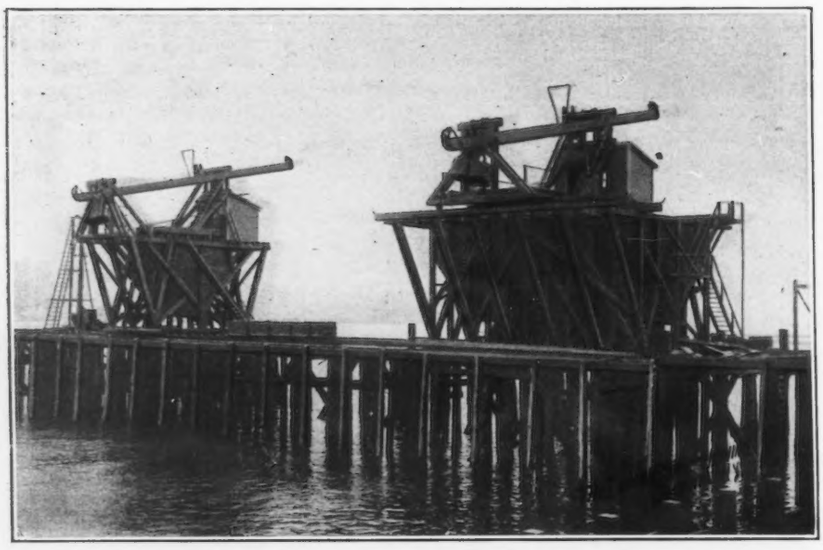
Wharf and Transportation Facilities

The Tyee company's wharf is about 250 ft. in length and is connected with smeltery bins by an incline 1000 ft. long. On the wharf there are two bunkers, one with a capacity of 300 tons and the other with a capacity of 100 tons. The smaller bunker is built on wheels and can be moved the whole length of the dock.

By means of this arrangement the bunkers can in a few minutes be adjusted so as to discharge from any two hatches of a vessel at the same time. These two bunkers are fitted with electric hoists and movable arms, which are projected to the required length by a small winch. The ore is hoisted in buckets at the rate of from 20 to 30 tons per hour for each hoist, dependent of course upon the rate of shoveling by the longshoremen. The unloading apparatus, which is shown in the accompanying illustration, has been designed with much care and has been found to work admirably in every respect. A counterweight is provided by means of which the buckets can only descend at a certain speed, thus avoiding any danger of accident to the men in the ship's hold.

The ore from the wharf bunkers is run into side-discharging cars of two tons capacity and is hoisted up the incline by means of a steam hoist. The cars are operated on this incline in three

trains of five cars each in such a manner that while one train is being weighed and emptied into the smeltery bins the second is on its way down the incline to the dock and the third is being loaded at the wharf bunkers; in this way 1000 tons of ore can be handled in 10 hours. After a train of cars reaches the top of the incline an electric locomotive takes charge of it and it is run upon a 40-ft. platform Fairbanks scale with a self-registering beam, the five cars being weighed at once. After weighing the cars are drawn over the smeltery bins and dumped, but after leaving the scales, one or more cars are switched to the sampling mill and dumped into the sample bunkers, the ore from which feeds directly to the crusher. The empty cars are then run back upon a side track, by which time another train of cars will have arrived at the top of the incline. As the full train is pulled upon the scales the empty train is let down to the bunkers at the dock.



WHARF BUNKERS, SHOWING MOVABLE ARMS

Arrangement of Bunkers

The wharf bunkers are built with one row of posts in the center with chutes on either side, so that while one train of cars is being loaded the third train passes to the other side and is ready to be loaded in its turn as soon as the second train starts on its way up. In this way the three trains are in use continuously.

There are four sets of bunkers at the smeltery with a capacity of about 7000 tons; there are also several hundred feet of trestling, giving a large capacity for stock ore. Ore arriving by rail from Vancouver island mines or via the Canadian Pacific railway is switched to the ore yard, where there is bunkerage for 1000 tons; thence it is trammed down to a set of bunkers at the furnace. The electric locomotive handles the ore cars over the bunkers and trestling in the manner described.

The Sampling Mill

The sampling mill covers an area 29x34 ft. and has a pit 14 ft. deep for the No. 4 gyratory Gates crusher. The ore is fed directly to the crusher and broken to pass a 2-in. ring; it is then elevated to the top of the mill and passes, on its downward course, first a Snyder disk sampler, then a Blake crusher, a second Snyder sampler; then passes through two sets of rolls, so that the sample which reaches the steel floor is the size of wheat. This sample is quartered down and run through a small grinder in the ordinary way and finally goes through a Braun disk pulverizer; with high-grade ores the pulp has to finally pass through a 200-mesh sieve, but with low-grade ores a 100- or 150-mesh sieve is used. The discard from the sample is elevated to the discard bin from which it is drawn off into 2-ton cars and dumped into the bin with the original shipment. The mill is operated by a 75-h.p. slide-valve engine.

Power Equipment

Steam for the different engines is supplied by four return tubular boilers totaling 400 h.p. The engine room contains a 100-kw. direct-current generator, directly connected to a high-speed Corliss engine; this supplies electric current to the dock hoists and electric locomotive and was manufactured by the Allis-Chalmers-Bullock company. There is also a 35-kw. direct-current turbine which is used as an alternative engine for supplying current to a single hoist or the locomotive alone, when required.

The blast for the furnace is supplied by a Connersville blower capable of delivering 8000 cu.ft. per min. at a pressure of from 24 to 30 oz.; this is belted to a Reliance Corliss engine.

There is now on the ground and about to be installed, a second blower for the new furnace now in course of erection; this will deliver about 14,000 cu.ft. of air per min. at 2 lb. pressure and will be belted to a cross-compound Reliance Corliss engine.

Smelting

There is in operation at the present time a 40x120-in. water-jacketed furnace built by the Allis-Chalmers Company. The capacity of this furnace is between 225 and 275 tons per day, although with easily smelted ores over 300 tons have often been put through in the 24 hours. The company is now installing a second furnace, 48 in. at the tuyeres by 160 in., built by the Allis-Chalmers-Bullock company. This furnace has the jackets sloping from the base plate to the feed floor, the size inside at the top of the jackets being 62x160 in. and the hight of the jackets 9 ft. 9 in.; there are 22 tuyere openings, inside diameter 6 in., arranged 11 on each side.

The molten material from the furnace flows into a forehearth 4 ft. wide by 12 ft. long, attached to which is a matte pocket through which the matte flows continuously if a sufficient amount is being made, but it can also be operated at intervals of an hour or so. The slag is granulated and carried out into the bay.

The grade of matte made is between 40 and 45 per cent.; it is run into pots and when cool is dumped out, broken up, sampled and shipped to refiners for converting. Arrangements are completed for a converting plant to be installed as soon as conditions warrant it.

A typical run of the furnace taken during this month, May, was as follows: Tons smelted, 289 per 24 hours; sulphur in the charge, 13.6 per cent.; average copper in the charge, 3.1 per cent.; matte assayed about 41 per cent. copper, making a concentration of 13 into 1. The slag was of the following composition: SiO_2, 45.72 per cent.; FeO, 19.8; CaO, 21.1; ZnO, 0.59; Al_2O_3, 6.55; MgO, 7.07. An analysis of the coke used is: Fixed carbon, 67.3 per cent.; volatile matter, 9.77; sulphur, 0.94; ash, 21.99.

The flue dust is caught in a chamber 8x10 ft. by 156 ft. long, from which it is drawn through small doors on the side into a ditch 1 ft. deep by 3 ft. wide; it is then dampened and fed back into the furnace direct, consequently there is seldom more than 50 tons of dust in the chamber.

Coke is delivered at the smeltery in hopper-bottomed cars by the Wellington Colliery Company. In order to avoid the erection of expensive trestling a pit was dug in the ground and in this runs an elevator belt carrying iron steps, which lifts the coke as fast as it is discharged from the cars and raises it to a hight of about 40 ft., whence it falls into a large pile adjacent to the feed floor; by means of movable chutes the coke can be piled either to the right or left at will. The

elevator is driven by a 15-kw. shunt-wound motor.

A Problem in Smelting

At present the smeltery is largely if not entirely dependent upon custom ore, and the furnace practice does not differ from that of other plants treating the same class of material, but when the ore supply was obtained mainly from the company's mine, an unexpected metallurgical problem presented itself on account of the high percentage of barytes and zinc in the ore. The skill and perseverance of Thomas Kiddie, then manager of the smelting works, resulted in an absolute refutation of the predictions that if the ore was worked at all it would have to be introduced into the charge in minute quantities.

Before going into the details of the Tyee work, it will be well to refer to what has appeared in the metallurgical literature on the action of baryta in furnace charges.

Influence of Barytes in Charge

"Barytes[1] and gypsum are reduced to sulphides and react like sulphide of iron with the oxidized copper compounds. Sulphide of barium may also pass into the matte. Barytes, sulphide of iron and silica interact at high temperatures, the silica displacing the sulphur trioxide of the first named, which splitting into sulphur dioxide and oxygen, oxidizes the sulphide of iron, forming ferrous oxide and sulphur dioxide. The double silicate of baryta and iron thus formed is readily fusible; this same silicate is formed by the action of silica and metallic iron upon barytes."

"Barium[2] sulphate in the blast furnace is partly converted into barium sulphide and partly into barium silicate. In both forms it causes an imperfect separation of matte and slag. The reaction is usually expressed by the following formula (Balling, "Metallurgische Chemie"):

$$2\,BaSO_4 + 8\,Fe + 4\,SiO_2 = (BaS, FeS) + 7\,FeO.BaO.4\,SiO_2.$$

"This would account for the formation of barium sulphide even if no barium sulphate were reduced by means of carbon. It would also lead one to suppose that all barium sulphide entered the matte, but the fact is that, while a very little can be discovered in the matte, most of it is dissolved by the slag. That barium sulphide can enter the matte under suitable conditions is proved by the mattes made in the Altai mountains, which contain, according to Jossa and Kurnakoff, 4 to 22 per cent. barium.

"According to Schweder there is another and more important reaction:

$$3\,BaSO_4 + 4\,SiO_2 + FeS = 3\,BaSiO_3 + FeSiO_3 + 4\,SO_2$$

$$BaSO_4 + 2\,SiO_2 + Fe = BaSiO_3 + FeSiO_3 + So_2.$$

"This means that in the presence of a metallic sulphide or a metal, barium sulphate is readily decomposed by silica; the liberated sulphur trioxide is decomposed at the elevated temperature into sulphur dioxide and oxygen, and this has an oxidizing effect on the iron sulphide or the metallic iron. Schweder found in his experiments that calcium sulphate and sodium sulphate act in the same way. Silicates of iron and baryta form very liquid slags. In computing a charge the baryta is figured as replacing part of the lime.

"From what has been said, it will be clear that all the sulphur contained in the baryta cannot be figured into the charge. In fact if 10 per cent. of the sulphur is figured as combining with iron to form iron sulphide, the amount will be covered."

Referring to heavy spar (barite, $BaSO_4$),

SIDE-DISCHARGING ORE CAR

Peters says[3]: "It is a remarkably stable compound, and is not affected in its passage through the roasting furnace. It is an unwelcome substance to the blast-furnace smelter, as may be inferred from the behavior of its feebler kindred compound, calcium sulphate."

"Heavy spar[4] is a substance which was formerly much dreaded by blast-furnace smelters when present in any considerable proportion. It is an exceedingly stable mineral, is not affected by the roasting process, and is apparently partly dissolved in the slag in its undecomposed condition, and party reduced to BaS, which substance enters both slag and matte, decreasing the specific gravity of the latter, and increasing that of the former, besides rendering the slag thick and infusible, and forming accretions.

"More active conditions and higher temperatures have lessened the evil as exemplified in smelting roasted heavy-spar ores at Tyee, B. C. It has been the opinion of most of the pyrite smelters that this process was particularly suited to the treatment of heavy-spar ores, and that the $BaSO_4$ would be decomposed and slagged; and the soundness of this view seems to be confirmed by the results sent to me by Mr. Sticht, which were given him by a Japanese metallurgist conducting pyrite smelting at Kosaka, Japan. At this place they are smelting about 1000 tons daily of ores, of which 600 tons contain about 45 per cent. heavy spar, the total ore mixture averaging about 30 per cent. of that mineral. They use 3 per cent. coke and no CaO, the BaO answering as a substitute."

"The gradual replacement[5] of CaO with BaO, causes a steady lowering of the formation temperature, until three-fourths of the CaO is thus replaced. Even when the entire 32 per cent. CaO is replaced by BaO, the formation temperature is only 1010 deg. C. The actual melting point of these slags is, however, considerably higher than their formation temperature would indicate. Still BaO slags are quite satisfactory, except that their specific gravity is high, and unusual pains have to be taken to affect a proper settling of the matte from them."

"Viewed purely as a flux for SiO_2, BaO would be a very disadvantageous base, owing to the high atomic weight of Ba (137) and its consequent low replacement value. A still greater practical objection to the presence of barium in ordinary blast-furnace work arises from the fact that this element almost always occurs, in ores, in the shape of heavy spar, $BaSO_4$. This mineral is infusible and extremely difficult to decompose and in ordinary blast-furnace work is largely reduced to BaS, forming a mushy half-fused substance which enters both matte and slag, causing metal losses and choking the furnace hearth. In the more oxidizing atmosphere of the pyrite and reverberatory furnaces, the barium sulphate is decomposed, and in moderate amount is not objectionable."

Barium enters slag as the silicate, and matte (slightly) as sulphide, rendering the former heavy though liquid, the latter light, and diminishing the chances of a good separation."

"Heavy spar[6] which has been hitherto a great bugbear to all blast-furnace managers, is found now to be a valuable flux, almost as desirable as lime, excepting for its lower saturating power and greater specific gravity. It is very easily eliminated in the pyrite furnaces, where with proper management it can, as I believe, be largely driven unchanged into the slag, mixing therewith, but without decomposing.

"Under other conditions of temperature, basicity of slag, etc., sulphur trioxide is

[1] "Handbook of Metallurgy." Schnabel. 1898 edition.

[2] "Metallurgy of Lead." H. O. Hofman. Fourth edition. Pp. 144, 145.

[3] "Principles of Copper Smelting." E. D. Peters; edition, 1907; p. 43.

[4] *Ibid.;* p. 316.

[5] *Ibid.;* p. 393.

[6] "Matte Smelting." H. Lang; pp. 38-39.

volatilized and the baryta unites with silica as in the reverberatory process.

"Still another result but as a rule a less useful one, is brought about in the German process and in lead smelting, where heavy spar being reduced to sulphide of barium, by double decomposition with metallic bases, adds largely to the matte 'all."

Apart from Peters' reference to the work at Tyee, it will be noted that the conclusion as to the effect of baryta is largely theoretical.

Practice at the Tyee Plant

The first published account of the Tyee practice is that of E. Jacobs on the "Tyee Copper Smeltery," in the *B. C. Min. Rec.*, 1904, p. 343. Mr. Jacobs says:

"The ore consists of chalcopyrite carrying gold, silver and zinc as well as copper, and contained in a matrix of quartz and baryta with some alumina. General average assay and analysis of 48,623 tons (wet weight): Cu (wet, by electrolytic assay), 4.56 per cent.; Ag, 2.87 oz.; Au, 0.14 oz.; Fe, 11.94 per cent.; Zn, 6.60; SiO_2, 13.50; Al_2O_3, 3.95; $BaSO_4$, 37.30; CaO, 2.20; MgO, tr.; S (as sulphide), 16.62.

"As the proportion of barium sulphate is 37 to 38 per cent. and of zinc 6.5, the smelting of the ore, in the absence of any previous experience or recorded results as a guide, presented a problem which, however, Mr. Kiddie soon solved, the outcome of his experiments and experience with this ore being that the smelting practice was so materially improved that eventually the furnace work compared very favorably with earlier results, the treatment capacity of the furnace having been increased from an average of 177 tons per day to 249.6 tons."

In the *Trans.* of the A. I. M. E., Vol. XXXVI, p. LXXXI-LXXXIII, there is a general description of the Tyee plant, together with an abstract of an oral statement made by Mr. Kiddie to the visiting members of the institute. "From the analysis exhibited, metallurgists could easily infer that the problem to be solved was a peculiarly difficult one, namely, the smelting of an ore containing 4.08 per cent. of copper, and 10.49 of iron, 37.63 barium sulphate, 7.36 of zinc, and 13.48 of silica; while the success of the metallurgical solution of this problem was evident in the production of a slag containing only 0.41 per cent. of copper, 0.14 (out of an original 2.67) oz. of silver, and a trace (out of 0.131 oz.) of gold per ton."

An average sample of the slags for the year, 1904, assayed: Cu (calorimetric assay), 0.39 per cent.; (electrolytic assay), 0.40; FeO, 17.98; SiO_2, 28.25; BaO, 27.63; CaO, 7; ZnO, 6.95; Al_2O_3, 10.88; MgO, trace; S, 0.88; Ag, 0.12 oz. and Au, 0.004.

The roasting and briqueting of the fines is one of the strong features of the Tyee practice, the result being a hard compact brick which stands rough handling.

The average analysis of the burnt ore for the year was: Fe, 10.50 per cent.; SiO_2, 17.90; $BaSO_4$, 38.90; Zn, 7.50; MgO, trace; S (as sulphide), 7.09. In the smelting the ratio of coke to ore was, 1 ton coke to 8.25 tons of ore. The concentration was 10.28 tons of ore to 1 ton of matte. The year's output in matte was: Cu (dry), 40.767 per cent.; Ag, 26.277 oz.; Au, 1.609 oz.; BaS, 7.47 per cent.; ZnS, 12.66. This is equivalent to a yield of copper (dry) of 3.96 per cent., silver, 2.55 oz. and gold 0.156 ounce.

Representative Ores, Mattes and Slags

At the time of my visit I was furnished with the following typical analyses of ores, mattes, and slags, representative of the average results of the previous year:

SLAG COMPOSITIONS.

	Tyee Ore.	Custom Ore.	
		Night Slag.	Day Slag.
Cu	0.33%	0.36%	0.39%
Ag	12 Oz.		0.12 Oz.
Au	trace		trace
FeO	17.70%	19.26%	17.20%
SiO_2	34.70%	36.25%	32.70%
BaO	28.50%	23.70%	30.20%
CaO	4.90%	3.47%	3.80%
ZnO	(Zn)6.10%	7.41%	6.00%
Al_2O_3	8.20%	10.03%	10.00%

The composition of the low-grade matte made from a low-grade ore carrying an excess of silica and over 10 per cent. zinc fluxed with limestone was: Cu_2S, 33.34 per cent.; FeS, 25.45; BaS, 15.83; ZnS, 23.53; sp.gr., 4.232. The slag produced while making foregoing matte analyzed: Cu, 0.37 per cent.; FeO, 12.21; SiO_2, 31.57; BaO, 27.14; CaO, 14.36; ZnO, 7.92; Al_2O_3, 6.75; sp.gr., 4.232.

The Tyee ore, analyses of which are given in the accompanying table, was smelted with 11 per cent. of carbonate ore containing: Cu, 3.5 per cent.; insoluble, 80; Ag, 6 oz.; Au, trace. The amount of coke used was 12½ per cent. of the charge; blast pressure, 29 ounces.

The night matte obtained from smelting the ore designated as "custom ore" in the accompanying table had this composition: Cu_2S, 50.37 per cent.; ZnS, 16.10; FeS, 29.13; BaS, 3.58. That of the flue dust was: Cu, 3.77 per cent.; Fe, 11.77; SiO_2, 18.56; $BaSO_4$, 28.30; CaO, 1.5; Zn, 6.79; MgO, trace; S (as sulphides), 5.82; Ag, 2.74 oz. and Au, 0.14.

Conclusions

At the time of my visit the baryta ores still formed a large percentage of the charge, and the fluidity of the slag and its separation from the matte was a marked feature. This bears out Schnabel's statement that "a double silicate of baryta and iron (which is readily fusible) is formed," and Lang's that "heavy spar, hitherto a great bugbear, is found now to be a valuable flux, almost as desirable as lime." Hoffman, on the other hand, claims that there would be "an imperfect separation of matte and slag." Peters, after speaking of its "rendering the slag thick and infusible and forming accretions," states in a concluding sentence that the evil has been lessened at Tyee and also refers to the Japanese practice.

ORE ANALYSIS.

	Tyee Ore.	Custom Ore.
Cu	4.36%	4.39%
Ag	2.60 Oz.	2.85 Oz.
Au	0.13 Oz.	0.14 Oz.
Fe	11.70%	10.70%
SiO_2	13.40%	12.70%
$BaSO_4$	38.60%	42.10%
Zn	8.00%	8.02%

If this account of the Tyee practice and results calls forth a statement of the metallurgical practice with similar ores at other works it will have accomplished its object.

Iron Mining in Cuba

The iron ores which have been mined in Cuba up to the present time consist largely of hematite and magnetite and are obtained near Santiago, in the province of Oriente (Santiago). Recently large deposits of brown ore have been attracting considerable attention, especially those of the Mayari and Moa fields in Oriente province and those of the Cubitas field in Camaguey province. No ores of this type have been mined however.

The accompanying table, taken from a report by E. C. Harder, of the U. S. Geological Survey, shows the shipments of iron ore from Cuba since the opening of the mines in 1884.

Shipments of iron ore from mines in the province of Oriente (Santiago), 1884-1908, in long tons.

1884	25,295
1885	80,716
1886	112,074
1887	94,240
1888	206,061
1889	260,291
1890	363,842
1891	264,262
1892	341,654
1893	351,175
1894	156,826
1895	382,494
1896	412,995
1897	454,285
1898	168,339
1899	377,189
1900	446,872
1901	552,248
1902	699,734
1903	623,621
1904	387,273
1905	561,159
1906	640,574
1907	681,393
1908	819,434

By far the larger proportion of this ore came to the United States, the imports from Cuba in 1908 being 579,668 long tons. This was about three-fourths of the total imports of iron ore; in 1907 Cuba supplied a little more than half the ore imported.

Annual Report of the El Oro Mining Company

Recovery of 89.65 Per Cent; Working Costs $5.42 per Ton for 285,181 Tons, Yielding an Average of $8.56 per Ton. Reserves 383,269 Tons

TABLES OF COSTS AND EXTRACTION

The 10th annual report of El Oro Mining and Railway Company, Ltd., for the fiscal year ended July 30, 1909, contains interesting data concerning the operations of that important company owning El Oro mine and other properties in El Oro district in Mexico, in the state of the same name. The report of the directors, R. T. Bayliss and Alfred Naylor sets forth that the capital of the company remains unchanged at £1,147,500. The total dividends disbursed to date amounts to £1,181,187. Since incorporation in 1898, there has been expended for permanent improvements and railway extensions, £417,401, of which £362,027 has been provided out of the revenue.

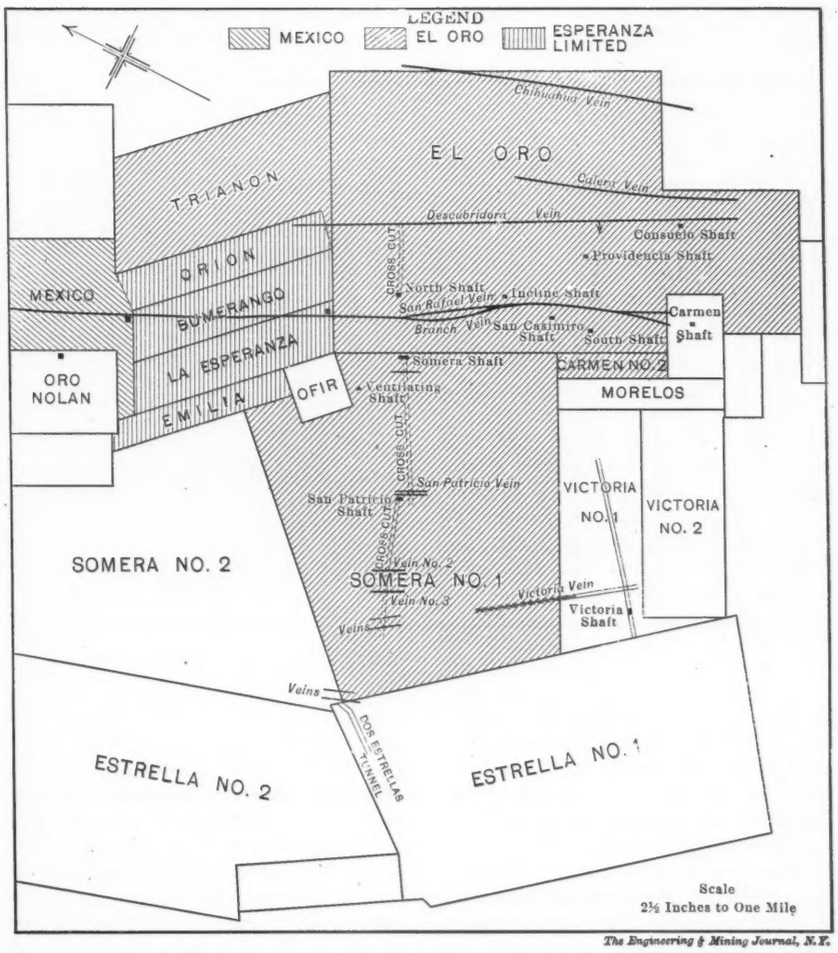
Gross Recovery and Costs

The report states that during the year various improvements in the reduction work has added to the efficiency and economy of operation. For the period, the No. 1 and No. 2 mills, comprising together 200 stamps, crushed 285,181 tons of ore, which yielded $2,442,374 from treatment in the cyanide works, being an average recovery of $8.56 per ton. This represents an all-around extraction of the gross gold and silver contents of the ore treated of 89.65 per cent.; and compares with the recovery of 89.41 per cent. in 1908, 86.63 per cent. in 1907, 84.93 per cent. in 1906, and 73.80 per cent. in 1905. The total average working costs per ton of ore treated during the year, including every expenditure in Mexico, was $5.42, which compares with $5.27 in 1908 and $5.01 in 1907. These working expenses include a sum of $0.88 per ton for development and $0.32 per ton for state and federal taxes.

Recent experiments conducted at the mine indicate that by employing a coarser screen in the stamp battery, and throwing more work on the tube mills, the duty per stamp, expressed in tons of ore crushed, can be materially increased; and it is anticipated that the installation of four additional tube mills, at a cost of about $30,000, will enable the No. 2 mill to crush as much, if not more ore than has previously been crushed by the two mills combined. Should this prove to be the case it will be possible to suspend the operation of the old No. 1 mill, and at the same time to effect an economy of not less than $3500 in the monthly expenditure.

Important Development Under Way

Concerning development in the mine, the report says: Developments in the southern section of the mine and upon the San Patricio vein in the Somera claim have been satisfactory. The development of the high-grade branch vein previously in the 1000-ft. and 1150-ft. levels has shown it to continue of payable value for a much greater distance above. Further development in depth has been rendered almost impossible, owing to the difficulties of ventilation. It became evident at the commencement of this year that the only method of overcoming this difficulty, and continuing the development of this high-grade ore in depth, in a practical and economical manner, was to put down a new ventilating shaft at the extreme north end of the property which will reach the 1000-ft. level at 1700 ft. from the surface. Work upon this shaft was commenced in February, 1908, and to the 30th of June it had been sunk to a depth of 460 ft., which the directors regard as very satisfactory progress. Unless unforeseen delay occurs this shaft will reach the 1000-ft. level in about fifteen months from June, 1909. When it is connected in its course downward with the 486-ft. and other levels below, very substantial relief will be obtained in the ventilation in the lower levels of the mine.



PLAN OF EL ORO, MEXICO AND ESPERANZA PROPERTIES

Report of General Manager

The report of A. F. Main, general manager, is included in the annual statement. This shows that the company owns 775 acres. The tonnage for the year

was much larger than for the previous year, being 288,577 tons as compared with 269,122 tons.

The statement of receipts for the year ending June 30, 1909 is as follows:—

Bullion recovered	£498,244
Railway department receipts	46,308
Sundry receipts	3,479
Profits on sales of shares and dividends on shares held	21,361
	£569,393

Concerning the development the report says: The northern orebody of the San Rafael vein continued to be the largest producer, and the southern orebody again occupied a good second place. The San Patricio No. 1 vein, in the center of the Somera claim, gave a very considerable tonnage, while the quantity extracted from the richer stopes on the lower levels of the San Rafael vein was relatively small. In the northern orebody, near the north end of the 286-ft. level, new stopes have been opened; also on the 186-ft. and 486-ft. levels north of the incline shaft. Preparations for stoping below the 486-ft. level are under way. In the southern orebody, on the San Juan level between the incline shaft and the southern boundary, in addition to stopes previously opened, new ones are being prepared, and ore-breaking is going on over practically the entire length of this orebody. On the 286-ft. level new stopes have been started on the farther end of the orebody, including the new and promising hanging-wall portion of the vein.

The quantity of ore mined is as follows:—

Northern orebody, 125,595; southern orebody, 93,390; lower levels, 10,856; San Patricio, 58,736; total, 288,577 tons.

A detailed explicit statement of the development of the different veins and levels is included in the report, and is in itself decidedly commendable for its specificness, clearness and completeness.

Summary of Ore Reserves

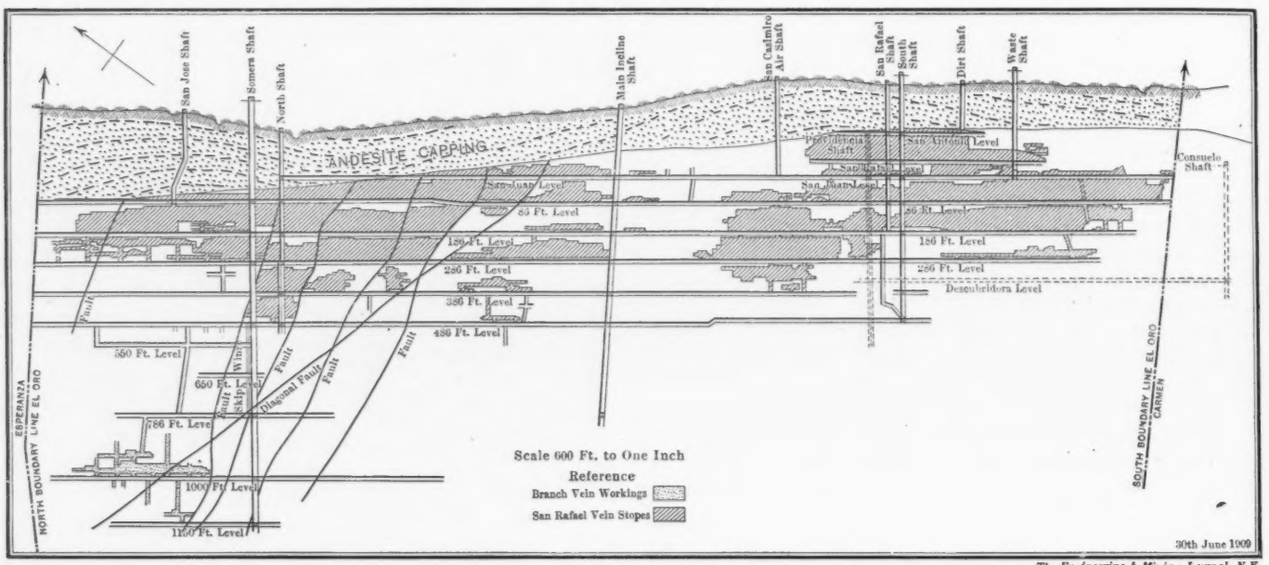
The ore reserves are summarized as follows:—

	Tonnage.	Value per Ton.
Northern orebody	125,298	$7.36
Southern orebody	95,348	7.31
Total	220,646	$7.34
Lower levels	53,728	18.00
San Patricio	108,895	8.30
Grand total	383,269	$9.10

In addition to the above values in gold the ore contains 4 oz. silver per ton.

Ore Treatment

In reference to the mill and cyanide departments the report says: The total amount crushed, 285,181 tons, was a good deal more than that of last year. This yielded bullion to the value of $2,442,374. For the first ten months the mills ran 96.3 per cent. of the full time. During May and June interruptions in the service of the electric power company reduced this percentage as well as the output of those months. The addition of two tube mills has helped very much in sliming the ore, with a consequent slight increase in the total extraction. The percentage of bullion recovery on the heavy sulphides from the lower levels is quite as good as obtained on the oxidized ore.



The Engineering & Mining Journal, N.Y.

LONGITUDINAL SECTION OF SAN RAFAEL VEIN, EL ORO MINE

Statement of Costs.

June, 1908 to July, 1909.

	Per Ton.
Mining	$2.50
Development	0.69
Milling	0.40
Cyaniding	0.90
Water supply	0.02
Taxes	0.32
General expenses	0.32
Total	$5.15
Total tonnage	285,181
Total costs	$1,469,168

Exceptional expenditure on the Somera property and on the new ventilation works increased the cost of development by $54,068 and the cost per ton from 69c. to 88c. There are further expenses which increase the total cost 8c., bringing it up to $5.42 per ton. The highest monthly tonnage was in March, 26,231, and lowest in June, 20,363 tons.

Working Costs

The total costs per ton remain at practically the same figure as last year, but mining has increased somewhat, this being offset by reduction in other departments. A large proportion of this increased mining cost is accounted for under the single item of pumping. The increased flow of water on the lower levels, and the preparations for later handling of still more from deeper development, has called for a considerable expenditure on new plant, in addition to the regular monthly expense in handling the present flow. The total cost of development was increased, and a still further expenditure will probably be made during the coming year. It may be mentioned that mining costs also bore a certain amount of expense that possibly

Mill and Cyanide Statement.

Total tons crushed	285,181
Mill days (No. 1 and No. 2 mills)	677.36
Stamp duty per 24 hours in tons	4.518+
Assay Value per Ton:	
Gold	$8.23
Silver	1.32
Theoretical Extraction:	
Gold, per cent.	92.06
Silver, per cent.	73.50
Total, per cent.	89.49
Actual Extraction:	
Gold, per cent.	91.55
Silver, per cent.	77.77
Total, per cent.	89.65
Bullion Realized:	
Gold	$2,149,091
Silver	293,283
Total	$2,442,374

might, with equal propriety, have been charged against development. Taxes show a reduction, owing to the fact that no gold was exported, all bullion being sold to the Mexico refinery.

Two tables herewith show the costs for the fiscal year and the mill and cyanide statement.

The company operates the railroad from the line of the National to the camp and also controls the Suchi Timber Company, both of which have contributed to the general profit of the corporation.

The Mexico Mines of El Oro, Ltd.

The report of the Mexico Mines of El Oro, Ltd., covering the fiscal year ended June 30, 1909, shows the continued success of this comparatively new operation in the El Oro district of Mexico. The directors' report, signed by R. T. Bayliss and L. Breitmeyer sets forth that the total realized profit for the year on the unaltered capital of £180,000, was £155,166 of which £135,101 was from the ore milled and £18,694 from the sale of 500 tons of high-grade ore.

During the year the 40-stamp mill crushed 101,105 tons of ore, from which bullion to the value of $1,257,559 was recovered, being an average yield of $12.44 per ton. This represents an all-round recovery of the gross gold and silver contents of the ore treated of 92.35 per cent., and compares with a recovery of 89.6 per cent. in 1908. The total average working costs for the year, including expenditure of every nature in Mexico, was $5.67 per ton, which compares with $6.33 in 1908. These working costs include a sum of 0.99c. per ton for development, and 0.65c. per ton for state and federal taxes.

Attention is called to the important development in the No. 7 level in which a vein of sulphide ore 15 ft. wide was cut, carrying 2 oz. 10 dwt. gold and 20 oz. silver. This is the northerly extension of the west vein of the adjoining Esperanza mine. The ore reserves available are estimated at 191,655 tons having an average value of gold of $10.90 and 7 oz. of silver, equal to $14.40 in all. The report of the general manager, A. F. Main, included, shows a total development for the year of 3791 ft. of which 1033 ft. was in ore, averaging $12.60 gold and 9.7 oz. silver, The main shaft has been sunk 40 ft. below the 7th level.

For the first eight months of the year the mill ran 97 per cent. of the full time. After that, interruptions from the retimbering of the shaft, and during May and June, the shortage of electric power furnished from Necaxa, combined to cut this average down. To offset this, during the last two months the daily stamp duty was very largely increased, and for June it exceeded 9.5 tons per stamp-day of actual running time, or a total daily output of 380 tons, which was successfully slimed by the tube mills. Treatment results were improved, and the Burt filter presses continued to do good work. Higher percentages of extraction on both gold and silver were obtained, and a saving of total values of 92.35 per cent. was effected. The total amount crushed was 101,105 tons, producing bullion to the value of $1,257,559.

The assay value of the ore treated was $9.48 in gold, $3.99 in silver, and the theoretical extraction was 94.05 per cent. of the gold and 86.60 per cent. of the silver; total 91.85 per cent. The bullion realized was 94.46 per cent. of the gold and 87.35 per cent. of the silver and the total actual extraction 92.35 per cent. The statement of costs per ton of ore crushed shows mining, $2.13; development, $0.99; milling, $0.30; cyaniding, $1.26; water supply, $0.02; taxes, $0.65; general expenses, $0.32; total, $5.67 per ton. This company is controlled by the Exploration Company, Ltd., of London, which also owns the El Oro Mining and Railway Company, Limited.

ELECTRIC LOCOMOTIVE USED AT THE ARGO MINE

Electric Locomotive for the Argo Mine and Tunnel

The accompanying illustration represents an electric locomotive recently built by the Baldwin Locomotive Works for the Argo Mining, Drainage, Transportation and Tunnel Company, of Idaho Springs, Colo. The electrical equipment of this engine was supplied by the Westinghouse company. The locomotive is in mining and tunnel service, and was built to fulfil most exacting requirements. The track gage is 18 in., and the clearance limits require maximum width not exceeding 32 in. The problem of constructing a six-ton locomotive to fulfil these conditions necessitated special treatment in order to produce a satisfactory design.

This locomotive has cast-iron frames placed between the wheels. The transverse distance between the journal centers is 11⅜ in.; the bumpers are also of cast iron, 32 in. in length. The frames are supported on coiled springs which are placed directly over the journal boxes. The locomotive is propelled by two K-6 motors, using 500-volt direct current. The motors are mounted above the frames and between the wheels, with 26-in. centers. They are both geared to a jack shaft whose bearings are placed directly on top of the frame.

The jack shaft is geared with a second shaft, which is journaled in boxes rigidly held between frame pedestals. This second shaft has balanced cranks keyed to its outer ends, and from these cranks the driving wheels are rotated by means of combined side rods and scotch yokes. This arrangement was adopted because the motors and shafts are spring supported, and the crank pins are, therefore, allowed sufficient play in the yokes to compensate for the movement of the frames on the springs. The driving wheels have cast-iron centers and steel tires, and are counterbalanced.

The motors are covered by a suitable casing, which can be readily opened when required. The diverters are also placed under this casing. A trolley-pole socket is placed on each side of the locomotive near the front end. The equipment includes an efficient brake which is operated by a vertical shaft and handwheel. The brake shoes bear on the backs of the driving wheels. Sand boxes are provided at each end of the locomotive and are cast in the frames. The fittings include a gong and two electric headlights.

This is an exceedingly compact locomotive, with a maximum proportion of its weight supported by springs. The working parts are easily accessible. The principal dimensions are as follows: Wheel base, 3 ft. 6 in.; drivers, diameter, 20 in.; journals, 3¼x4½ in.; width, 32 in.; hight, 3 ft. 9 in.; length, 9 ft. 10 in.; weight, 12,000 pounds.

Transportation by Electrical Suspended Railway

Installation at Copenhagen in Which Five Systems of Suspended Railway Satisfactorily Handle All Transportation at Moderate Cost

BY A. GRADENWITZ*

The main tendency in the construction of modern transporting plants is to reduce as far as possible the number of men employed. In this connection an efficient system is that of Albert Bleichert & Co.'s electrical suspended railways, comprising an automatic suspended track, the cars of which are propelled by motors fitted into the traveling gear. The electro-motors fitted laterally into the traveling gear have been constructed specially for this purpose with a number of turns, so that a single toothed-wheel gear between the motor and the traveling wheel is sufficient. Into the wheel is fitted a brake engaging automatically as the current is interrupted. The whole traveling gear is substantial and is protected against dust and atmospheric influences so as to insure a year-long life to the trucks even in the case of greatest strain.

The current is supplied to the traveling gear through connecting wires strung out in parallel to the traveling rail, which serves as a back conductor. Owing to the simplicity and readiness of current supply, the electrical suspended railway adapts itself to any local conditions, negotiating shunts and curves of a minimum radius of 2.5 m. with safety and without any supervision. There is no necessity for the trucks to be moved along, the operator having only to insert a switch in order to start a truck. At the station desired the truck, after the corresponding section of the trolley wire has been made dead, stops of its own accord.

*3 Regensburgerstr, Berlin W., Germany.

Control of the System

As the trucks thus travel without any supervision, means should be provided for controlling their mutual distance and preventing collision. This is effected by Bleichert & Co.'s patented block system.

The controlling wire is divided into sections insulated from one another, the length of each of which corresponds to half the truck distance. Simple switches allow the current to be cut out from those sections and to be thrown in again, so that each two trucks comprise between them a conductor section made dead by which the subsequent truck will be arrested as soon as it approaches beyond an admissible limit. The trucks themselves effect mechanically this operation by throwing in and out, avoiding any sensitive parts and thus excluding any disturbance of the block system. A likewise patented automatic locking system prevents any derailment owing to the passage of open shunts.

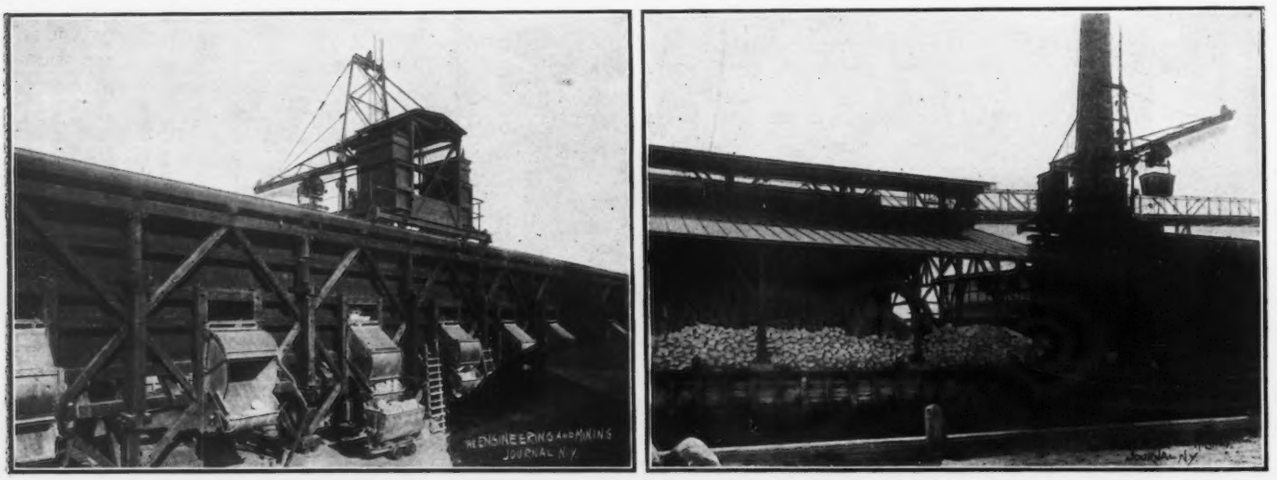
The railway line is designed either as closed loop traversed by the trucks in a constant direction or as a simple open track with pendulum operation. The reversal of trucks at the terminal stations in the latter case can be effected automatically. The cars are also discharged automatically as a rule by the locking lever of the car body striking the cam fixed to the truck. By adjusting the position of this cam the operator is free to effect the unloading at any point desired.

The trucks of the railway are frequently equipped with an electrical capstan for raising and lowering the transporting trough, as shown in an accompanying illustration. A magnetically controlled mechanism allows any kind of motion—lifting, lowering, traveling, reversing, etc. No special operator is generally required in this connection, the few manipulations being effected by the man in charge of the loading.

Equipment in Which Five Suspended Railways Are in Operation.

The Ny Kalkbraenderi of Copenhagen recently decided to equip the whole of its works with this system of suspended railway. The operations to be performed at the works comprise: Unloading the limestone from the ships and storing it in an elevated storehouse; putting up a winter store in a covered shed; supplying the annular furnace with coal; transporting the burned lime to the discharging stations and to the slacking trough; and coaling the boilers. No less than five electric suspended railways are at present in operation for dealing with these difficult operations, according to the plan reproduced in the accompanying sketch.

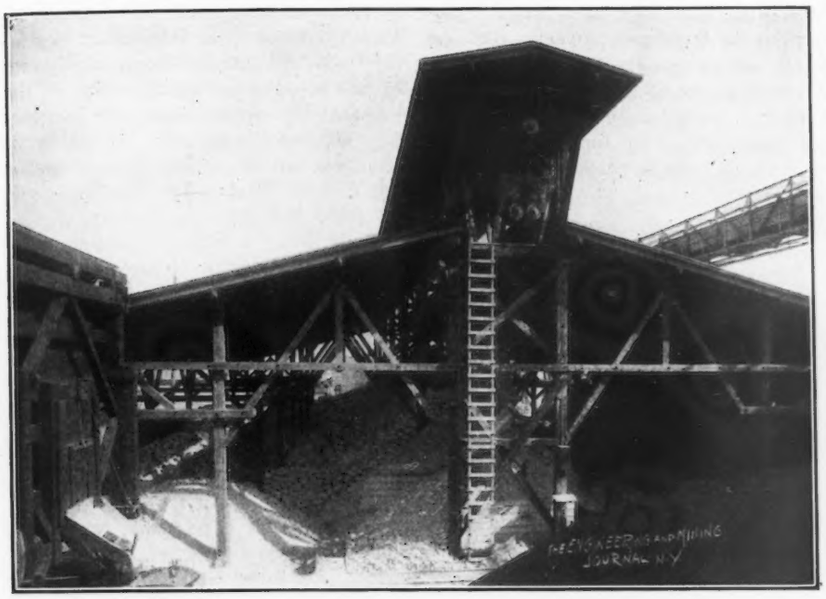
Railway No. 1 is intended for unloading the vessels and consists of an I-rail mounted on a transportable iron frame, the front part of which projects beyond the water's edge; it can be folded up so as to be readily withdrawn in warping ships carrying high masts. On the rail travels a capstan truck, the case of which can be lowered into the vessel, there to be exchanged for a filled bucket. After then being lifted, the truck bucket travels over the limestone silo situated alongside the water's edge, on which runs the unloading frame. After there being dis-



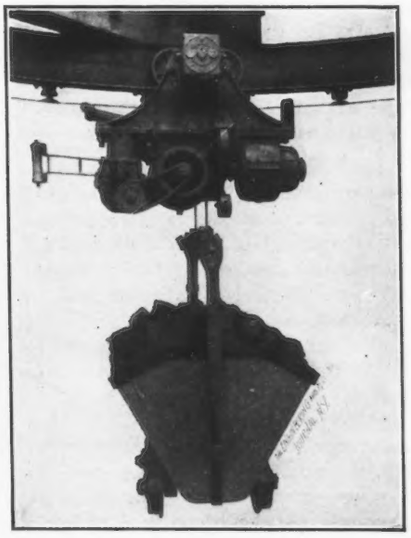
TWO VIEWS OF RAILWAY NO. 1 FOR UNLOADING VESSELS

charged, it is reversed automatically and returns to the ship. From the silo, the limestone is discharged through locks of special construction, which allow large pieces to pass into light railway trucks. The locks consist of two cylindrical slides of which the lowermost is destined for the passage of fine material, whereas the upper one is open only to the passage of coarse pieces. The stream of material accordingly can be controlled with great accuracy. However, the main advantage of this design is that the slides on being locked, so far from penetrating violently through the material, simply cause it to accumulate at its natural sloping angle so as to come to rest. In fact, in order to interrupt the discharge of material, the upper slide is at first lowered down on the store of material, seizing the upper layer and thus causing the material to accumulate. The slight residual stream of material is then arrested by the small slide cutting vertically upward without encountering any considerable resistance.

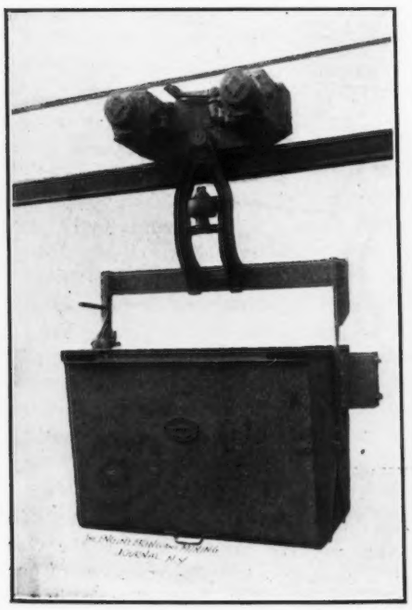
The running trucks are shoved either directly to the annular furnace or to the limestone shed serving as the winter storehouse. Below the roof of this shed is situated the traveling rail of railway No. 2, on which likewise travels a capstan truck for lifting the filled buckets and transporting them. In order to prevent the limestone from dropping, the case is lowered at the unloading station to an existing store, there to be discharged by a magnetic disengaging device. All the operations are controlled by a man at the loading station, at *a* in the sketch, by means of a simple long-distance switch above described.



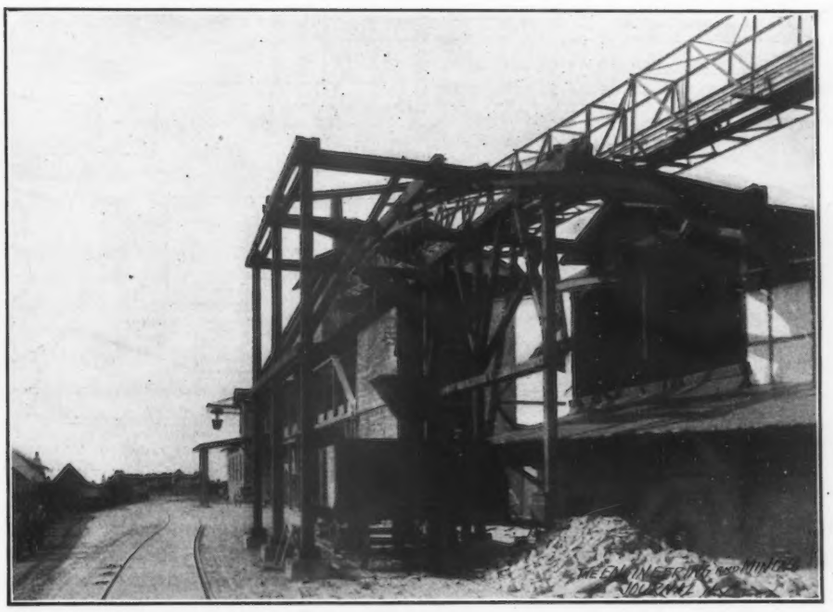
WINTER STOREHOUSE, SHOWING RAILWAY NO. 2



TRUCK EQUIPPED WITH ELECTRICAL CAPSTAN FOR RAISING AND LOWERING CAR



CAR PROPELLED BY MOTOR IN TRAVELING GEAR



RAILWAY NO. 3 FOR CARRYING COAL FROM RAILWAY CARS TO ANNULAR FURNACE

Operation of Railway No. 2

The operation of the railway is as follows: After hanging the bucket that arrives on the narrow-gage track, into the capstan suspension, the workman throws in the controller, after which the case is lifted in order to stop automatically in the uppermost position. The second con-

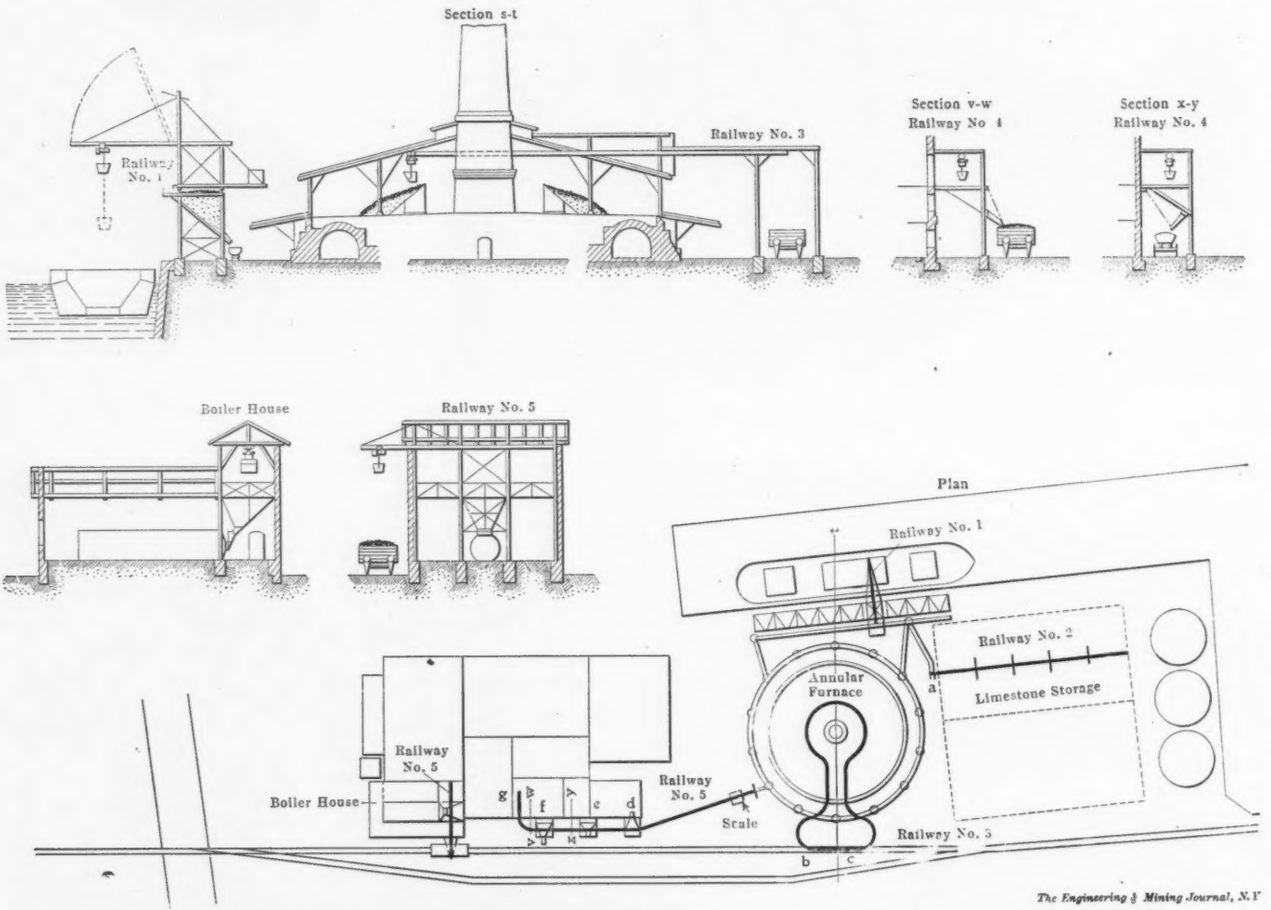
nection results in the suspended-railway truck traveling over the store, there to stop at any desired place by interrupting the current. By next completing the circuit, the capstan is made to start the loaded bucket over the store-yard, while after the fourth connection the tilting magnet fitted to the suspension is made to disengage the lock of the bucket which then is discharged by tilting, erecting itself of its own accord. On the fifth operation of the switch, the capstan lifts the empty bucket. With the sixth operation, the truck returns to the starting point *a*, and with the seventh operation, the capstan starts the empty bucket over the narrow-gage track after which it is uncoupled from the lifting ropes.

The operation of the railway can be effected by the men in charge of the shoveling of coal from the railway cars into the buckets.

Railway No. 4 conveys the burnt lime from the furnace to the slaking trough and to the ball mill and unloads it into cars. It leads beyond the store-yard to a covered bridge so as to prevent the lime being moistened, after which it arrives at the bunker *d*, conveying the lime to the slaking trough, then to the bunker *e*, which serves to load teams, or to the bunker *f*, from which the railway cars are unloaded. The lime is then discharged at *g*, to be conveyed to the ball mill. The track comprises a weighing machine operated by the man on the working platform. This weighing machine is provided with a printing outfit that registers the weight of the useful load contained in the bucket.

There is finally a fifth electrical suspended-railway which serves for coaling the boiler house. Its rail projects outside of the building, beyond the railway track, and in the interior travels over the bunker carried by special iron supports on which the coal slides down immediately into the automatic fireplace of the steam boilers. The capacity of each of the railways 1 and 4 is 20 tons per hour and that of the remaining only 5 to 6 tons.

Owing to the simplicity of construction, the first cost is so low as to make even small-sized plants profitable in spite of a sometimes imperfect utilization. The cost of maintenance is low, the electrical suspended-railway dispensing with any special superintendence, while the cost of current consumption is immaterial. About 0.006 kw.-hour is required to convey 1000 kg. effective load a distance of 300 ft. on a horizontal track. In the event of the current being purchased at the rate of about 5c. per kilowatt-hour, the cost of current consumption for this duty would be about one-thirtieth of a cent, and far cheaper still in the case of a special plant. The transport of one ton, inclusive of the cost of maintenance, in the case of moderate distances, hardly exceeds 1c. The amount corresponding to interest and amortization is partly compensated for by an increase in the safety of operation.



PLAN AND SECTION OF EQUIPMENT AT NY KALKBRAENDERI, COPENHAGEN

RAILWAYS NOS. 3 AND 4

Railway No. 3, which has been designed as a closed cycle, is intended for conveying coal from the railway cars to the annular furnace. On the track *b-c*, are lifted the buckets that have been loaded in the railway car, to be taken over the furnace and there automatically discharged at one of the unloading stations. The buckets have been given a unilateral design so as always to tilt on the side turned toward the stoking holes.

An aluminum solder, mentioned in the *Journ. Soc. Chem. Ind.* Sept. 30, 1909, is made by fusing 130 grains of antimony, ½ lb. zinc, ½ lb. tin, and 44 grains salicylic acid.

Improvements in Compressor Valves

Many who are familiar with practice in steam- and gas-engine speeds often question why it is that air compressors are operated at such relatively slow speed. Also why it is that the usual air compressor is so noisy and runs with so much vibration. These two questions are closely related and, in fact, the expert on compressors will tell you that the cause of the speed limitation in all sizes of air compressors, except the very large ones, is due to the sluggish action of the discharge valves. When you consider that the discharge valve must have a full and unrestricted opening and must also close instantly within a hundreth of a second or less, it is apparent why this should be so.

Various methods have been employed to make the action of the discharge valves more rapid, the principal one being to reduce the weight as far as possible. This has sometimes been carried to extremes with the result that the valve becomes too weak to stand the strain upon it. Another method which has been used with good results is to cushion the opening of the valve by means of a dashpot action, using air to bring the opening motion to a stop, and the compression of this air then assists in moving the valve back to its seat. These two methods have been carried to the practical limit permitted by the common type of mushroom valve.

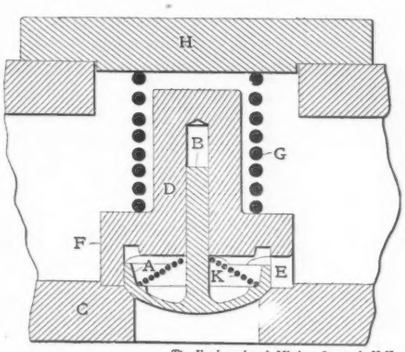
The Improved Valve

A new type of valve, illustrated herewith, has been devised for carrying these methods still further. "*A*" represents the valve proper; "*B*" is a small guiding stem which serves merely to steer the valve in its motion; "*C*" is the seat or portion of the cylinder in which the valve rests; "*D*" is the guide for the valve and stem and also serves as a stop for the outward motion of the valve; "*E*" is one of a series of ports in the circumference of the guide; "*F*" is one of a series of legs which comes between these ports and centers the guide upon the seat; "*G*" is a heavy spring which is intended only for holding the guide down in its place without the necessity of making a rigid connection between the guide and the cover "*H*".

It will be observed that the diameter of the grinding portion of the valve is considerably in excess of the diameter of the opening which is the nominal size of the valve. It will also be noted that the valve is very light in weight because of the fact that the guiding portion is short. This guiding portion does not need to be of any greater length because the valve is held to its proper direction by the stem "*B*." In operation the top edge of the valve guide passes back and covers the edge of the ports "*E*" in the guide. Whatever air is between the valve and guide at this point is thus inclosed and acts as a cushion to bring the valve gradually to a stop, and this in turn builds up a pressure back of the valve which assists in returning it to the seat. The spring may consequently be light and the resistance to the flow of the air through the valve is very little. This valve operates almost noiselessly and is capable of a high rotative speed.

A comparison showing the exact relation of the weight, cushion area, etc., is shown in the accompanying table Valves designated as A and B are two well known types of cushioned mushroom discharge valves which represent the best previous practice in this line; and valve C is of the type described.

The usual speed of compressors ranging all the way from 4 to 24 in. stroke, does not exceed 150 r. p. m. With this valve, however, there is no reason why compressors should not be operated up to piston speeds corresponding to those used in steam engines. These valves have been tried out under severe conditions and have proved themselves highly satisfactory. The valve is the invention of C. A. Dawley, formerly engineer of tests for the Ingersoll-Sergeant Drill Company. The advantages of this type of valve may be summarized as follows:



The Engineering & Mining Journal, N.Y.

IMPROVED COMPRESSOR VALVE

COMPARISON OF VALVES.

Discharge Valve Type.	A	B	C
Diameter of opening in inches	2⅛	2⅜	2⅛
Area of nominal opening in square inches	3.55	4.43	3.55
Diameter of cushioning portion in inches	1⅜	2.0	2½
Area of cushion in square inches	1.48	3.14	4.91
Initial spring tension in pounds	6.0	5.0	3.0
Valve weight per square inch of opening area	0.20	0.165	0.107
Cushion area as per cent. of valve area	42.0	71.0	138.0

Operating Features—(1) Lightness in weight without reduction of strength. (2) Large area of cushion compared to the opening area. (3) Valve guided close to seat. (4) Opening cushioned, making the action of valve free from vibration and pounding. (5) Rapidity of action.

Features of Construction—(1) Valve can be made from a drop forging and submitted to proper heat treatment, then the stem hot-riveted in, and the entire valve finished by grinding. This makes the best as well as the cheapest method of manufacturing. (2) No necessity for perfect alinement between valve cover and seat. (3) Valve cannot be displaced from its seat by distortion due to heat or pressure.

The Selukwe Gold Mine

Special Correspondence

The Selukwe Gold Mining Company, Ltd., is one of the oldest of the gold-mining companies of Rhodesia, crushing having been commenced as far back as 1898. During its career the mine has produced to date, according to the "Mining Yearbook," 623,000 tons of ore, from which £1,250,000 has been recovered. Yet in spite of its riches, the operations have given very little satisfaction to the shareholders. Dividends amounting to 6s. per £1 share are all that have been paid to the owners. Nor are the future prospects at all bright; indeed, they are quite the reverse. The report for the year ending March 31, 1909, records a loss of £28,707. The actual working expenses and revenue approximately balance, but this result is obtained by omitting expenditure on development, a necessary preliminary to stoping, and an expenditure which belongs to a statement of working account quite as much as stoping and milling. When development and depreciation of plant are taken into account there is a deficit of £28,707 as already stated.

During the year under review the 40-stamp mill treated 61,392 tons, from which gold amounting to £63,372 was won, or a recovery of 20s. 8d. per ton. The ore reserves have fallen from the figure given in the last annual report and are now valued at a total of 117,404 tons, made up of 33,984 tons assaying 7.4 dwt., and 83,420 tons valued at 4.32 dwt. per ton. Of these ore reserves the manager classes only 15,291 tons valued at 8.6 dwt. per ton as payable. It is evident from these figures that milling cannot long be continued. The directors report that they are having an examination of the mine made by a prominent engineer, whose name is not given, and it will, no doubt, dpepend on the advice received whether further expenditure will be incurred in the development of the mine in the hope of finding something better than has been met with in the past. Judging from the balance sheet, a reconstruction of the company appears inevitable unless winding up is decided on. Quite recently some cables from the mine have been published announcing encouraging developments, but whether the discoveries are of importance or a mere flash in the pan remains to be seen.

Wastes of Heat and Materials in Smelting Works

Proposed Heating of the Blast by Slag While Annealing the Latter for Building Material. Utilization of Heat of Jacket Water Considered

BY HERBERT LANG*

The illuminating address of Dr. James Douglas upon the subject of the conservation of our natural resources, in the JOURNAL of June 12, 1909, may well be the inspiration of much thought and labor directed toward the prevention of waste in our mines and manufactories. As to the latter, it is proper to call attention to subjects which appeal to many metallurgists and engineers with peculiar force, namely, the loss of heat and substance in the slag and jacket water of smelting furnaces. The subject of the slag and its included heat has been much discussed and various methods of utilizing not only the slag, but its heat as well, have been described and the question in its various phases must be fairly well understood; but there are certain relations which render it worth while to explore the matter farther, at the risk of reiterating what has already been said.

According to present practice the slag is mainly thrown away, or at best used for railway ballast or for filling in sunken lands. A small proportion is used for the manufacture of blocks or slabs for rough building purposes, such as the foundation of houses, for retaining walls and for dams. Besides such uses there are the more important ones wherein slag of phosphatic character is converted into fertilizer, and wherein basic calcareous slags are made into hydraulic cement. The latter uses are restricted by the chemical character of the slag required, while its use for casting directly into building blocks is hampered and limited by the backward state of the manufacture, and the apparatus and methods employed. It is in this direction that progress may be anticipated and achieved.

HEAT CONTAINED IN SLAG

It is well understood that the outflowing slag (cinder) of iron, copper and lead furnaces contains something near 400 calories of heat, sensible and latent, which makes the slag at the moment of its exit from the furnace equal in heat contents to about one-seventeenth of its weight of good coal; that is to say, a ton of such coal will produce on being completely burned 17 times as much heat as will be given out by one ton of slag during its period of cooling. The question of the conservation of this heat, taken in connection with the vast and increasing output of slag, which is now measured in tens of millions of tons annually, is therefore of considerable economic importance.

In regions where fuel is scarce or costly the money value of the heat thus wasted would evidently be very great. I have in mind certain isolated localities where, owing to the excessive cost of fuel for the smelting works, a ton of hot slag would have a value for the heat within it of fully 80c.; in other localities, owing to the extensive scale of operations, as much as $500 worth of heat is daily lost in the air. Such facts should be sufficient incentive to engineers to induce them to give attention to methods of obviating a present waste of no small magnitude.

I have hitherto dwelt upon methods of conserving this heat and have detailed the apparatus which I have found useful in such connection, the process consisting in employing traveling molds, cars or pans, filled with the hot slag at the furnace, and moving outwardly therefrom to a convenient dumping place, which may be above, below, or upon the furnace level. The method is one of gradual cooling and conveying, and as the blocks are automatically removed from the molds, the process is accomplished at a minimum of cost. In fact by no other means, excepting possibly by granulation in running water, can the slag be taken away from the furnace in so cheap a way.

The objects sought are three, namely: The removal of the slag from the furnace; the production of masses of regular and useful shape; and finally, the conservation of the heat of the slag. To effect these ends it becomes necessary to subject the slag to protracted cooling within a confined space from which the liberated heat cannot escape into the atmosphere. The pans or molds are connected together in trains, mechanically propelled, and travel lengthwise through a tunnel of brickwork or of metal covered with some nonconducting material, as asbestos board or the like. The slag dispensing its heat to the air within the tunnel and raising it to a high temperature, furnishes a means for heat utilization by employing it for aiding the combustion in a boiler firebox, or for heating the blast of the furnace, or in other ways that may suggest themselves.

By connecting the hot end of the tunnel with the firebox a draft is set up which brings the heated air into contact with the fuel, fresh air being drawn in at the cooler end and heated in turn. Apparatus of this character gave an efficieny of 50 per cent., measured on the proportion of the heat actually delivered, and a higher efficiency might reasonably be expected from apparatus of improved design. It is perfectly practicable to preheat the air for boiler use to 1000 deg. F., and to save two-thirds of the fuel in ordinary cases.

SLAG AS A STRUCTURAL MATERIAL

My proposals to employ the cakes or blocks of slag thus obtained for economic purposes, such as mine "timbering" and the like, have been met by the objection that the slag is often brittle, and insofar unfit for such purpose. Such criticism leaves out of account the improvement that may be wrought upon even the most brittle of slags by the process of slow cooling and annealing, and ignores the question as to the particular use which is proposed for the material. To reiterate that because some slags are brittle, slag in general has no industrial value for building purposes is highly irrational. In order to reach a conclusion as to its usefulness we must first consider what uses it is to be put to, and the improvements necessary to adapt it to such uses.

Even the most brittle of slags may by slow annealing be made to reach a considerable degree of toughness, such as would suit it to a variety of purposes, and there are methods of reinforcing the blocks by which they may become as durable under shocks as ordinary kinds of stone or brickwork. Two centuries ago it was suggested by an English inventor to incorporate within the mass of yet molten slag fragments of rock or of already cooled slag, with the object of providing centers around which the liquid might solidify, obviating its tendency when in large quantity to form "pipes" at the center by which the mass is much weakened and sometimes rendered quite useless. The expedient is a valuable one and has been invented and reinvented by myself and other experimenters, and I have added the suggestion to preheat the solid fragments, in order that a more perfect junction may be formed with the slag, adding strength to the block.

By this means the perfected block, after its slow cooling and annealing, is found to possess great strength and solidity, not inferior, perhaps, to the best specimens of sandstone and granite. It

*Metallurgical engineer, 489 Twenty-ninth street, Oakland, Cal.

is obvious, however, that such a method is inconsistent with the manufacture of small blocks, and that it is more adaptable to the formation of large monolithic masses, upon the spot where they are to be used. Considering the comparative facility with which such masses may be produced, it would seem that their use for the coarser forms of construction might be extensive. I have not considered it feasible to attempt the formation of these large slag-concrete monoliths by means of the apparatus before mentioned, owing to their weight and the impracticability of adding the solid matters at the furnace side.

I have used the slag *in situ* in the construction of a small bridge and several culverts and find no difficulty in it. As has been remarked by others who have experimented in this way, it would not do to use rock decomposable by heat in forming the concrete, as the gases which would be given off at the high temperature reached within the mass would surely disrupt the block. This would be the case with limestone, or any other carbonate, and also with any hydrous material, etc. Probably those stones, like basalt, andesite, porphyry, diabase, diorite, etc., which have a chemical composition like that of slag itself, would serve the purpose of a filling the best, because they have a fusing point not very much above that of slag, and hence would be most apt to superficially fuse and attach themselves firmly to the groundmass of slag, when the mixture would simulate closely the tufaceous family of natural rocks.

Casting Slag Mechanically

Without some especial means of casting and transporting slag bricks and blocks during the operation of the furnace we cannot claim an advanced state of the art which, during its reliance on the old methods of casting in sand and removal from the moulds by hand, was of small repute; but I venture to think that my patented method of forming the blocks as well as of removing them without incurring additional expense over the ordinary method of emptying slag by means of hand pots, is a distinct advance that must in time be recognized.

In some respects we are not greatly ahead of the practice of half a century ago; but doubtless we are now able to appreciate better the scope and value of mechanical methods of handling these masses, and their utility in certain forms of construction.

Probably the greatest drawback to their extensive employment lies in the fact that builders expect and demand too much from such a cheap and comparatively crude substance. If engineers would consider the limitations of its usefulness and endeavor to devote it to purposes for which it is known to be fitted, I believe that use could be found for every pound of slag produced in situations where the cost of transport did not debar it.

Using Slag Blocks in Mines

I have devised methods for utilizing slag blocks or slabs in various connections, and in particular for mine "timbering" (more properly, filling). In localities where trees are scarce or sawed lumber costly, or where security against fire counts for much, the matter has great interest and importance. In mines which are so situated that the transport and placing of the blocks can be done by mechanical means, and without inconvenience to the progress of the mining work in general, the matter is worthy of consideration. It must be borne in mind that the material must be prepared and handled in large quantities to be of practical use, and that the individual blocks must be of considerable size, both from the circumstances of their manufacture and from the fact that truly economical methods of handling, inside and outside of the mine, demand the employment of mechanical means instead of human muscle.

It would probably not pay to use masses of less than two or three cubic feet for such purposes and it is likely a much larger size would be found advisable. The problem then of transporting and placing them becomes one of considerable complexity, demanding special arrangements and much foresight. The conditions under which the method could best be operated would be as follows: The tunnel or the collar of the shaft of the mine should not be above the furnace level; there should be railway communication between them; the underground openings should be within the vein itself, so that transport of the blocks should be facilitated as much as possible; and finally, the vein should be vertical or have at least a considerable dip. I shall take another opportunity of laying before mining engineers the means by which I proposed to carry out the method of slag filling at a large mine in California.

Waste of Hot Water

Another noticeable waste in smelting practice is that of the hot or warm water issuing from the jackets of the smelting furnaces. Two distinct losses, that of the water and that of the heat contained, are involved but may be regarded as one when we consider the efforts that have been made to eliminate them. The obvious means of supplying steam boilers with the jacket water is indifferently practised in this connection with, no doubt, some measurable advantage in many cases. To obtain the greatest good from such a practice the water should be discharged from the jackets at the highest practicable temperature, which would be the boiling point pertaining to that altitude above sea-level. But so elevated a temperature, while compatible with the demands of smelting practice, cannot be generally attained owing to the forms of construction adopted by most furnace builders. Nevertheless, economy both of heat and water demands that the quantity of the latter be restricted as much as possible, experience having amply shown, at least with respect to furnaces driven at moderate rates, that the running of the jacket water at or near the boiling point sensibly enhances the rate of smelting.

Any project for utilizing the heat of the jacket water should begin with the proviso that the water must be very hot, in order that the withdrawal of the heat may be rapid and fairly complete; and I have constructed sets of jackets to be arranged in cascade form, by which the uppermost tier receives the cool liquid, which is delivered successively to lower and lower ones, the heat augmenting as the water descends, until it issues boiling from the lowest. This is as it should be; for if the increased temperature of the liquid is at all beneficial to the smelting process the greatest benefit will be attained when the lowest and hottest part of the smelting zone is embraced by the hottest jackets. By this means the quantity of water (which is in an inverse ratio to its temperature) reaches a minimum, and the conservation of the heat may be undertaken with the best prospects of success.

When run in this way the jackets may be made to take the place of the water-heating appliances which are so generally a part, and an important one, of the steam installation. Perhaps we may add to this the further notion that they may also serve as a water purifier to a small extent, since they may be so constructed that the deposition of sediment within them may be less troublesome and less difficult to deal with than when it collects within a boiler. Jackets of this description are, of course, open at the top, both to facilitate the introduction of tools and to allow the escape of steam, which forms to some extent and must be allowed free vent.

It has more than once been proposed to utilize the jackets of a blast furnace as steam boilers, wherein the vapor was to be generated under pressure; but the voice of experience strongly disapproves it as a dangerous innovation and of doubtful utility. Yet there is a reason, and a weighty one, for the practice of evaporating the water in the jackets wholly or partially, as by so doing we may reduce the consumption of that fluid more than fourfold; and however much we may condemn the act of generating

and confining the steam within the jackets to the peril of life, we must applaud the idea of absorbing the surplus heat through the production of vapor rather than through the medium of torrents of water, which at times is barely warmed. For not only are we able to apply means whereby the heat may be abstracted from the steam, and preserved to the process, but the amount of water which must be provided is much diminished.

Various Proposed Methods

We may disperse the contained heat of the water by exposing it to radiation, as in a tank, after the manner advocated by Bartlett; or by passing it through a cooling tower; or through pipes exposed to the atmosphere. Such methods do no more than waste the heat, although they conserve the water supply to some extent. Another group of inventions, which has been exploited to some extent, proposes to use the contained heat for elevating the temperature of the air blast. This is divisible into two sub-groups, the one of which seeks to abstract the heat while the water still remains within the jacket, while the second removes the hot water to a more distant and more convenient place, whence, after parting with its caloric, it may be returned to the furnace.

The patents of Douglas and of Canavan possess interest as types of the former class. Both propose the use of deep and roomy jackets, containing within their water space a system of air pipes so arranged as to convey the blast from the bustle pipe to the tuyeres, and to transmit the heat from the surrounding water to the inclosed air. Thus these pipes and the blast within them are raised in temperature, while the water is correspondingly cooled to the advantage of the process and the conservation of water. We may observe of all such inventions that the space within which the apparatus is installed would prove insufficient for great efficacy, and that the process of heat transference must take place disadvantageously, since the water in the upper part of the jacket, where the air blast enters, is necessarily hottest, and that therefore the apparatus would to a certain extent serve to transfer the heat from the hot water at the top to the cold water at the bottom of the jacket. The natural and most advantageous way of heating the air would be to bring it first into contact with the coolest water, and then progressively to the hottest, whereby the greatest efficiency is secured and the greatest amount of heat transmitted.

The Colorado Iron Works engineers have solved the problem more neatly and practically by encircling their furnace below the feed floor, but above the jackets, with a tubular receptacle connected by risers with the top of the jackets, which are closed. Ebullition takes place wholly within the receptacle and the heat, or a portion of it, is absorbed by the blast which is led through pipes placed within the receptacle and surrounded by steam or hot water. Such an apparatus must necessarily be more efficient than the other form, but it is still open to the criticism that the progressive heating of the air and cooling of the water are insufficiently provided for. There must, however, be a considerable gain in the economy of the furnace, taken as a whole.

Separate Cooling Apparatus

Those inventions which, by removing the cooling apparatus to a distance from the furnace, seek to gain a higher efficiency than can be obtained in the limited space within the jackets or upon the sides of the furnace, consist for the most part of coils of piping contained within a casing, through which the hot water is made to circulate by means of a force pump. The blast plays around or upon the pipes in its progress from blower to furnace, taking up the heat. Ample space may be had, and a high degree of efficiency may be got by extending the area of the heated piping exposed to the blast. I have employed pipes of an aggregate length of several hundred feet, inclosed in a metallic casing, simulating a boiler in form, but, of course, the reverse of a boiler in functions, since it is the water which heats the air, instead of the gases which heat the water.

The blast, in such an installation takes the contrary direction from the hot water in conformity with the principles of such heating. The transference of heat depends largely upon the difference in temperature between the hot water and the blast, and it is obvious that it would not be possible in such a plant to raise the latter to a higher temperature than the boiling point of the former, or 212 deg. F. as the maximum, and the practical results would no doubt invariably be much lower; hence we cannot regard this apparatus in the light of a hot-blast stove by any means. But although the advantages of a hot blast can be secured only in a minor degree, the saving of water may be almost complete, and in consequence the invention must be of prime importance to those who contemplate smelting in situations where water is scarce or where it is desirable to use it over again.

The arrangement will be seen to be precisely like the familiar radiator of the motor car, excepting that the powerful influence of the blast is relied upon to cool the coil which contains the hot water instead of the more casual currents of air set in motion by the passage of the car or by the fan within the bonnet. As with the motor radiator it has been proposed to substitute for the water a solution possessing a higher boiling point, allowing the liquid to absorb more heat and attain a higher temperature before evaporating, whereby the air blast may attain a higher temperature by the contact.

Calcium chloride is usually regarded as the most available salt for this purpose, it being well known that its saturated solution has a boiling point of about 350 deg. F. Whether the introduction of such a refinement into practice would possess advantages under ordinary smelting conditions may be doubted; but like all such suggestions it is worth trying, especially as the cost of the test would be so small as to be negligible. A further suggestion that the water be wholly vaporized in the jackets and condensed in contact with the blast-heating pipes may be dismissed as impracticable, or at least disadvantageous, from the necessity of inclosing the jackets and thus endangering the structure, as well as the operatives.

The practical installation of a cooling plant on such a system demands that the furnace, or its jackets at least, be of special construction in order that the overflow may be at or near the boiling point, but there is no doubt that by these proposals the amount of water for a given installation may be much reduced and an added degree of efficiency bestowed on the furnace operations through the gain in temperature of the blast. On the whole, the advantages are sufficient to justify moderate expenditure in many cases.

The Tomboy Mines

The profit made by the Tomboy Gold Mines Company, Ltd,, during the year ended June 30, 1909, amounted to £59,861, out of which two dividends of 2s. per share each, absorbing £60,000, have been paid. The tonnage milled has been 102,844 tons, from which bullion to the value of $820,457 has been realized at a cost of $480,527, yielding a profit of $339,930. Improvements in the concentrating and magnetic departments of the mill have resulted in a reduction of the working expenses to $4.67 per ton, compared with $5.13 per ton during the previous year.

The ore reserves have been maintained at practically the same figure as last year and are estimated at 400,000 tons. The net result of the development work on the Argentine group has been to considerably augment the ore reserves of the lower levels and to slightly diminish last year's estimates of the upper portion of the mine. The Tombov group has been worked by leasers and the company has realized in royalties the sum of $1499. In the company's mill the ore has averaged a yield of $7.98 per ton.

Temperatures During Cupellation

R. H. Bradford (*Journ. Ind. and Eng. Chem.* I. pp. 181-184) has made some investigations of the temperatures during cupellation. A Le Chatelier thermo-electric pyrometer with a couple of a platinum wire and a 90 per cent. platinum 10 per cent. rhodium wire was used in the experiments. The cold ends were kept at a known temperature by immersing in water along with a thermometer and were connected to a galvanometer of high resistance by copper leads. The couple was carefully calibrated and the calibrations plotted. To prevent the destruction of the wires when the junction was immersed in the molten lead, a thin coating of fire-clay was applied. The coating was made on the spot from moistened raw material and applied in a thin enough coat to offer but little interference with the surface oxidation of the lead button.

Lead buttons were introduced into cupels placed at varying distances from the front of the muffle and hence at varying temperatures to determine the minimum temperature of the lead button requisite for starting cupellation. Pyrometer readings of the heating metal and the cupel interior were taken in each instance. It was determined that the molten metal must attain a temperature of 900 deg. C. or above before driving commences, or approximately the temperature of melting litharge.

Horizontal holes ⅛ in. in diameter, were drilled to points beyond the centers of the cupels and at different levels in the different cupels, from directly beneath the bottom of the cup-shaped depression, to the bottom of the cupel directly above the muffle floor. The temperatures of the interiors of the cupels were then readily ascertained by inserting the junction of the couple. The temperature directly under the button, in every case in which the cupel had been properly pre-heated although lowering as the lead melted, rose to 900 deg. C. or above before cupellation commenced. The temperature of the lower layers was usually a few degrees higher when the button opened, the melting metal apparently having taken its heat from the upper layers.

The temperature within the cupel and near the molten lead remained at 906 deg. C. or above so long as the button continued to drive. A rapid lowering of the temperature of the interior was noticed if the button froze, showing that its heat was mostly derived from the heat of the oxidation of the lead. If a button was introduced into a cupel whose interior was well below 906 deg. C. and the cupel and its contents pushed backed into the muffle, the button began to drive when the heat radiated from the muffle roof, raising the litharge coating of the lead to a temperature of 906 deg. C. The temperature of the button raised rapidly if allowed to remain in the same position, which temperature of course would cause excessive silver and gold losses. The formation temperature of "feather" litharge was found to be below 906 deg. Centigrade.

The experiments established that when the driving is well started, the lead attained a higher temperature due to the heat of combustion, enough heat being developed to keep the button driving even though the cupel and its contents was drawn forward to a cooler position in the muffle. A temperature of 625 to 650 deg. C. may be maintained ¼ in. above and near the front of the muffle, with a gentle draught through the muffle, without danger of freezing, although the danger of freezing is lessened if the temperature is from 650 to 750 degrees.

Cupellation will continue as long as the heat of combustion maintains the lead above the temperature of melting litharge. Feather litharge will form as long as the surrounding air is kept well below the temperature of melting litharge and will not disappear unless the temperature is raised above that point, although a slight volatilization takes place.

A Hot Blast Furnace for the Small Operator

A letter has been received from Hugh G. Elwes, metallurgical engineer, of Mexico City and El Paso, in which he calls attention to the fact that the New Model smelter described in an article in the JOURNAL of Oct. 2, written by Percy Andrus Babb, does not give full credit to the inventor, Allen R. Partridge. The failure to mention Mr. Partridge's name in connection with the article was an obvious oversight, and the JOURNAL takes pleasure in printing this reference to the matter in order to place the subject correctly before its readers.

Notes on the Milling System of Mining

BY ALBERT H. FAY

In point of low mining cost the milling system of mining comes next to the steam-shovel work. The conditions under which it can be used, however, are limited. One requisite is that the ore should extend to the surface or near enough so that the ground may be stripped. All surface water must be kept away. The ore must be of such a character that it will slide or roll well and not pack in the mill holes. A fine granular ore is preferable to one containing clay; hard ore will also work well. Weather conditions interfere with this system, for rains wet the ore and it is liable to pack in the chute, while snow and ice make it almost impossible for men to work on the steep sides of the open pit.

In the Mesabi district the steam shovel has almost supplanted the milling system. However, there are a few places where it

A MINE USING THE MILLING SYSTEM OF MINING, MESABI RANGE, MINN.

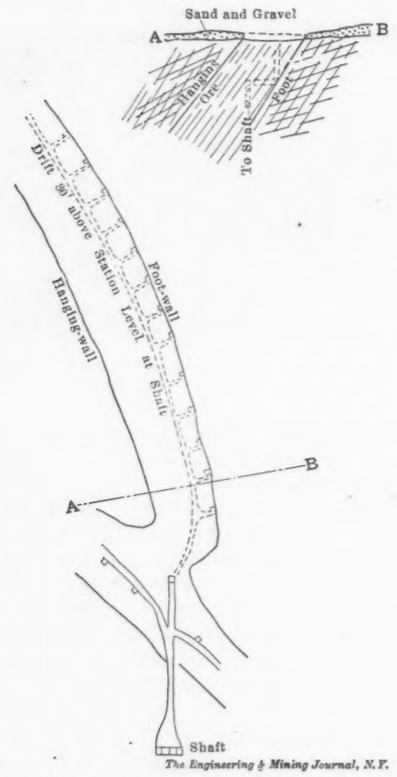
is still being carried on successfully. It can be used to advantage on orebodies that are too small for steam-shovel installation, or in places where it is impossible to use steam shovels and railroad cars on account of topographic features.

The general scheme is first to strip the overburden off the ore; from a shaft or adit level a drift is run about 100 ft. below the top of the ore, in circular or elliptical form, so that when using electric motors they may make a complete circuit. The main haulage way, shown in an accompanying sketch, is connected at intervals of 50 ft. with crosscuts from which raises 50 ft. apart are sent to the surface. These raises are not timbered and are usually 4 feet square. Hitches are cut in the walls in order to secure the scaffold upon which the miners work, in the raise. A chute is built at the bottom so that the ore may be delivered easily to the car. When the raises are completed the work of breaking ore at the surface is begun at the edge of the raise. All the ore goes to the bottom of the chute. A half dozen of these raises

may be worked at once, thus giving ample room for several groups of laborers. As the work progresses more room is available for additional men. In some of the mines electric haulage is used while in others, especially the Crete mine, mules are used.

MILLING SYSTEM AT TRADER'S MINE

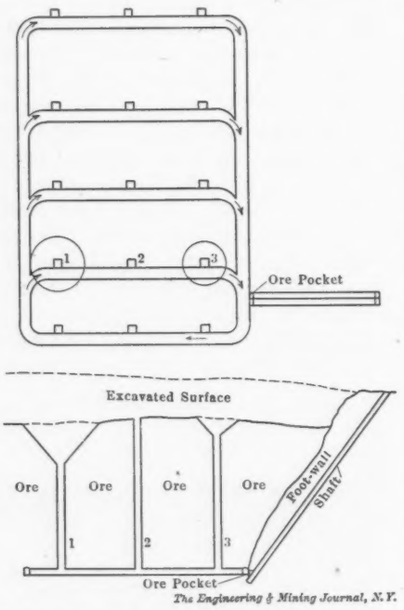
An accompanying sketch shows the general arrangement of the drift and mill holes at the Trader's mine, Iron Mountain, Mich., where hard ore is being mined. The footwall is well defined and dips of about 70 deg. toward the southwest. The orebody is approximately 200 ft. wide; its position is shown in the upper part of the sketch. At this mine the overburden to be stripped is glacial drift from 3 to 10 ft. thick. The main haulage drift is 50 to 75 ft. from the footwall and at intervals of 100 ft. crosscuts are driven to the footwall, from the end of which a raise is made to the surface, 130 ft. above; this strikes the top of the orebody near its center. The raise starts from the side of the crosscut so that the weight of the column of ore is not on the timber forming the chute. The ore is trammed by hand



PLAN OF WORKINGS AT THE TRADER'S MINE

in 1¾ ton cars to the shaft where it is hoisted in skips of like capacity.

In working hard ore great care has to be exercised in keeping all the loose rock barred down to prevent it from falling on the men. This is done by one or two men working on the slopes with a rope tied around their waist to prevent falling, especially on the footwall side where the slope is about 70 deg. When all the loose rocks are knocked down, places are selected near the mill-holes to set the air drill, and usually two 10-ft. holes are put in and loaded with 8 sticks of 27 per cent. dynamite. The superintendent found that this is most economical as the men seem to think it requires 8 sticks of powder to break the ground, regardless of its strength. A section about 10 ft. thick is thus broken and work pro-



GENERAL ARRANGEMENT OF HAULAGE WAY AND CHUTES

gresses up the slope until the top is reached, when the machines are again taken down to the mouth of the mill-hole and another cut started. At this mine from 7 to 10 tons of ore per man are broken per shift. From 10 to 16 mill-holes are now being worked. When pieces of ore break off that are too large for the mill-hole they are broken by exploding dynamite upon them. It is seldom that holes are ever drilled in them for breaking purposes. The haulage drifts are double tracked. No timbering is necessary except at the chute.

Broken Hill South Company

The half-yearly report of the Broken Hill South Silver Mining Company, for the period ended June 30, 1909, shows a balance to credit of profit and loss account of £120,638, with net liquid assets amounting to £58,902. Two dividends aggregating £40,000 were paid, and £10,416 were written off for depreciation on plants. The property is situated near Broken Hill, New South Wales. The whole of this year's production of concentrates has been sold and contracts have been entered into for a portion of the 1910 and 1911 production.

Negotiations have been concluded with the DeBavay's Treatment Company, for the treatment of zinc tailings on a joint account basis for seven years. This contract goes into effect on Jan. 1, 1910, and the Treatment company has sold its production of zinc concentrate for the period of the contract. The mining company is to receive a cash payment of 3s. 6d. per ton when the tailings are delivered, and after a similar sum has been credited to the Treatment company and actual costs ascertained, the available balance will be divided. A supplementary agreement has been entered into providing for the treatment of tailings during the current year, the mining company receiving a flat rate of 3s. 9d. per ton.

From the treatment of old mill tailings by the Zinc Corporation, Limited, the company received £4032, and from other mine products £155,922. The working expenses for the period were £109,441, the balance to profit and loss account being £50,513. The products on hand include an estimated tonnage of tailings and slimes, as follows: Old mill tailings (Zinc Corporation, Ltd.), 1,078,743 tons; new mill tailings (De Bavay), 74,602; old mill slimes, 140,432; new mill slimes, 35,366. The tailings carry from 16 to 18 per cent. zinc, 4 to 6 per cent. lead, and a small amount of silver. The slimes average about 14 per cent. lead, 6 oz. silver, and 12 to 16 per cent. zinc.

The total tonnage of ore raised during the half year was 137,846 tons, this being a record production for any six-month period. The ore averaged 14.9 per cent. lead, 5.5 oz. silver, and 12.1 per cent. zinc. Nearly 90 per cent. of the ore produced was obtained between the 725-ft. and the 970-ft. levels. All of the ore mined was loaded and trammed by contract and 97 per cent. of the ore raised was stoped by contract, the average earnings of the miners stoping by contract being 12s. 6.6d. per shift.

The working costs per ton of crude ore were 13s. 10.6d., distributed as follows: Mining 9s. 2.5d.; development, 9.1d.; concentrating, 3s. 11d.; while the working costs for the six months show a decrease as compared with those of the previous period, the full effect of the new plant was not felt until late in the half year when larger tonnages were dealt with.

The recovery of metals in the concentrates was: Lead, 74.2 per cent.; silver, 52.7; zinc, 5.6, as against 73.5, 53.4 and 6.8 per cent. respectively, during the preceding half year. Approximately 1360 ft. of development was done during the current period and the ore reserves were estimated at 3,250,000 tons. The average number of employees was 801. Since the inception of the company in 1885, 2,043,769 tons of ore have been raised.

The Coosa Coalfield of Alabama

The Most Southeastern Coalfield in the United States Contains 80,000,000 Tons of High-grade Coal. Why the Field Has Not Been Developed

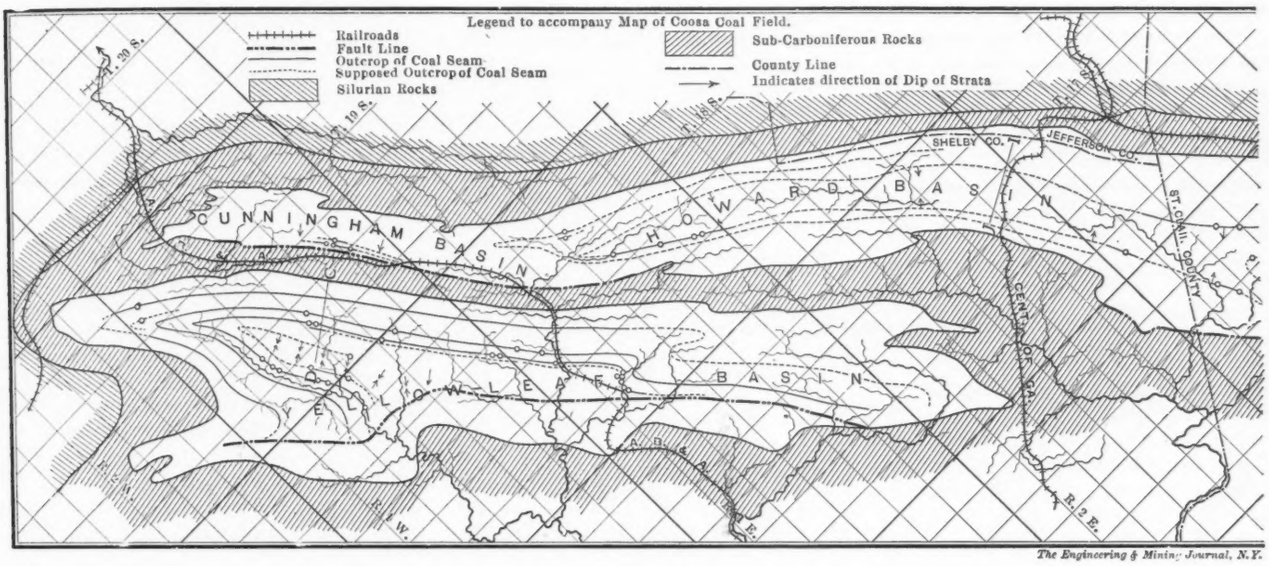
BY WILLIAM F. PROUTY*

The Coosa coalfield is the most southeastern of the coalfields of the United States, a distinction which helps to explain some of its extremes of character. The field occupies an area of about 260 square miles lying in a narrow strip, varying from three to seven miles in width, and extending in a northeast-southwest direction for a distance of about 60 miles mainly through Shelby and St. Clair counties, in the north-central part of the State. The field derives its name from the Coosa river which flows close to its eastern border and whose branches drain its area.

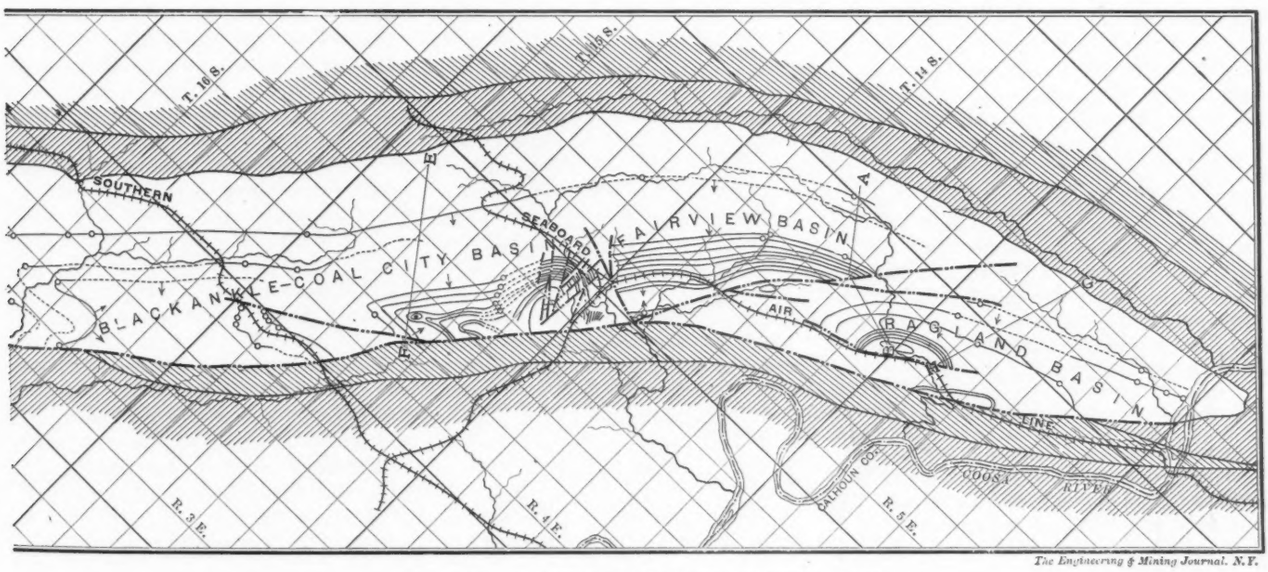
The Coosa is by far the smallest and least important of the coalfields of Alabama; the productive portion of the Cahaba covers about twice, and that of the Warrior about 12 times as much area; both of these latter fields have larger coal reserves.

As early as 1847, the Coosa field was being developed in the Ragland basin. The high grade of its coal for foundry and forge work was early recognized, and during the war it was extensively mined for this purpose, the coal being shipped by barge down the Coosa river. The development of the field since that time has been slow because the other coalfields of the State have offered, with their much larger number and thicker seams of coal, cheaper mining.

Because of the more rapid development

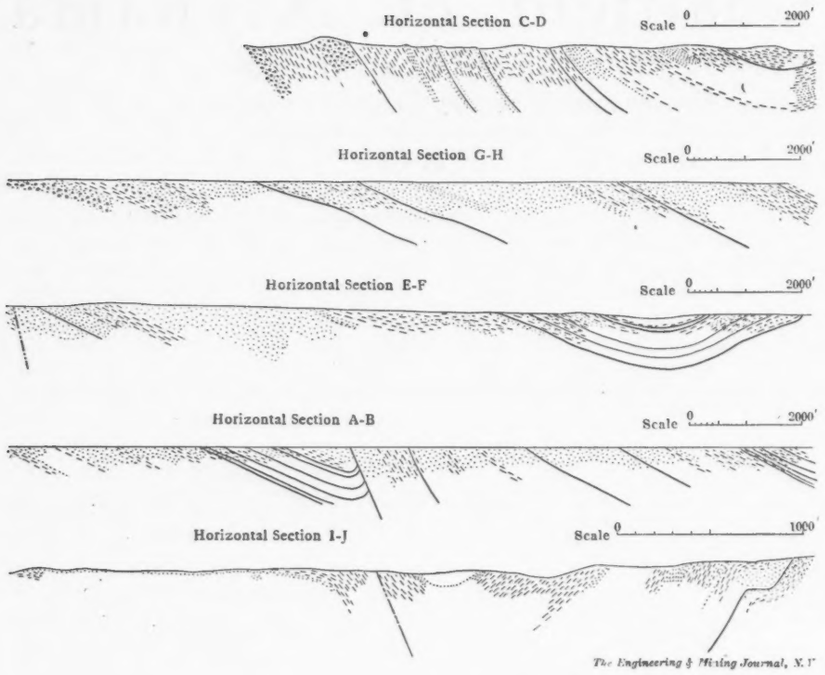


WESTERN HALF OF THE COOSA COALFIELD OF ALABAMA

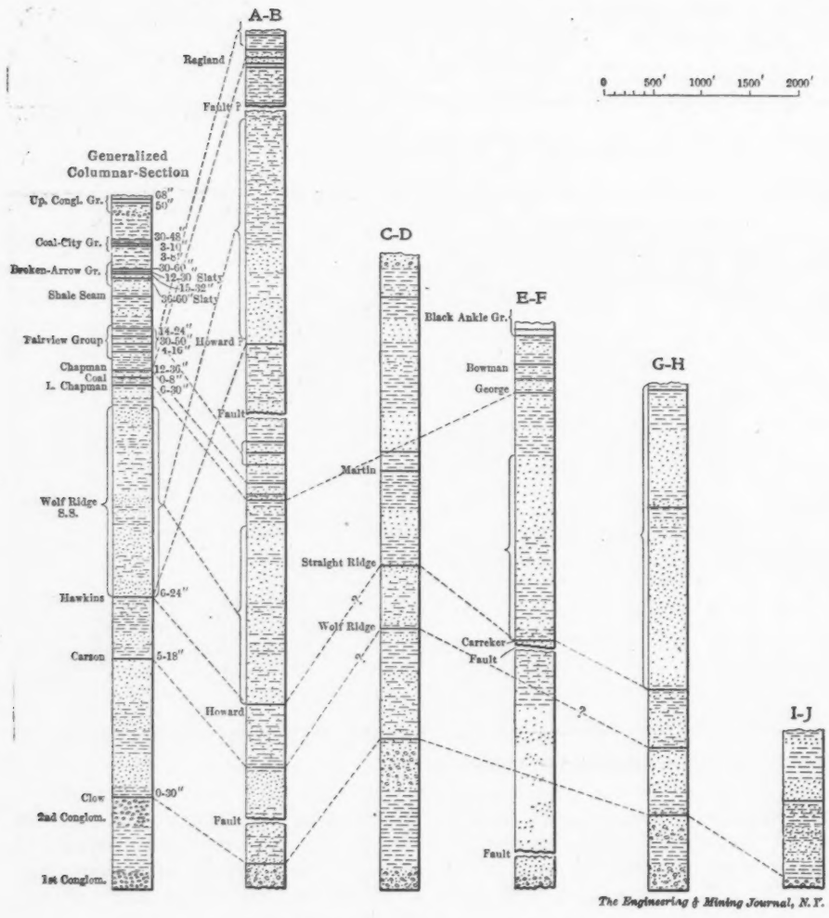


THE COOSA COALFIELD OF ALABAMA—EASTERN HALF

*Assistant to State geologist, University, Alabama.



HORIZONTAL SECTIONS—COOSA COALFIELD OF ALABAMA



COLUMNAR SECTIONS IN THE COOSA COALFIELD, ALABAMA

of the other fields and the greater demand for information concerning them, the State Survey has felt it necessary to first study and map these more important districts, and in consequence a map showing the outcrop of the seams in the Coosa field has been delayed until now, although a preliminary report of general observations was published some time ago[1].

The present map is necessarily somewhat preliminary in its nature because of the lack of development to show up more fully the true nature of the seams. It represents, however, in a concise and usable form the more important facts as to the outcrop of the coal beds, their thickness and the general structure of the field. With the exception of the southern third of the map, which has as a basis a recent and most excellent topographic sheet, the mapping has been done largely by the use of sections. It is hoped that the map will be useful in the guidance of those who are contemplating mineral development in this territory.

Thickness of the Coal-bearing Measures

The thickness of the coal-bearing measures in the Coosa exceeds that found in any other field of the State, being 7000 ft. in the Coal City basin, in which locality are found the thickest seams in the district. Were these same seams present in the southeastern part of the field we would expect a much greater thickness of the measures there, arguing from the much greater thickness of the basal rocks there represented.

Although the thickness of the Coosa coalfield is greater than that of any other field in Alabama (the Cahaba having a maximum of 5230 ft. and the Warrior a maximum of 3000 ft.) yet its highest coal seams correspond to some of the lower seams in the other two fields of the State. From this fact, it is evident that the coal-measure rocks are rapidly thickening toward the southeast where the sediments are of a much coarser nature than those in the Cahaba and Warrior fields to the west. Thick beds of conglomerates, coarse-grained sandstones and arenaceous shales are the predominating rocks and, as is usual in such coarse sediments deposited near shore, the thickness of the beds along the strike suffers sudden changes.

As the Paleozoic sediments thicken toward the southeast in the Appalachian district, there is also an attendant growing complexity in the nature of its folding and faulting so that the structure of the Coosa field is more complex than that of any of its neighboring fields to the north and west. Five of the six basins are separated from their neighboring basins by a well marked fault or series of faults. Practically the whole eastern border of the field is cut off by a large displacement.

[1] "Report upon the Coosa Coalfields," by A. M. Gibson, 1895.

Some of the basins are, moreover, very intricately faulted. Practically all of the larger faults, those bounding the field and those separating the different basins, are of the reverse thrust type and in some cases the throw is very great, as for instance the east boundary fault of the three northern basins. Here the Trenton limestone is brought up in contact with the top of the coal-measure rocks, indicating a vertical throw of some 10,000 feet.

The District Is Divided into Six Basins

The Coosa field is properly divided into six basins, each of which, with one exception, is separated, as before stated, from its neighbor by a marked fault which in one case brings to the surface a considerable thickness of the sub-carboniferous measures between.

Named in the probable order of their importance, the basins are as follows:

THE SIX COOSA BASINS.

Name of Basin.	Approximate Area in Square Miles.	No. of Seams.	No. of Seams Workable throughout Their Area.	No. of Seams Workable in Places.
1. The Black Ankle-Coal City basin	75	20	4	4
2. The Fairview basin	32	10	0	4
3. The Ragland basin	31	8	0	4
4. The Yellow Leaf basin	67	5	0	3
5. The Howard basin	45	3	0	1
6. The Cunningham basin	7	2	0	0

I have made an estimate of the probable amount of coal that is available in the Coosa coalfield. In those seams where the coal is of the most excellent grade and not too deeply covered, an 18-in. seam has been considered as workable in this summary. The available amount of coal, according to this estimate, is much less than that represented by previous ones, which is accounted for through the facts that those previously made were based on fewer observations, and as a rule at places where the seams were much above the average thicknesses.

The estimated totals for the different basins are:

	Tons.
Black Ankle-Coal City basin	25,691,000
Ragland basin	13,230,000
Fairview basin	19,600,000
Yellowleaf basin	17,600,000
Howard basin	4,800,000
Total for Cossa field	80,921,000

The Ragland basin while it has less coal than either the Yellow Leaf or the Fairview basins is considered second in importance because of the most excellent character of its available coal.

It is semi-officially announced that the representatives of Germany, France, England and Spain will meet in Paris shortly to consider a mining law for Morocco to be promulgated under the acts of the Algeciras convention. The mineral resources of this country are attracting attention, and are likely to become of importance in connection with the extension of European interests in that direction.

Liquid Oxygen for Rescue Work in Coal Mines

By Alfred Gradenwitz*

Owing to the enormous accumulation produced by liquefaction, it will be readily understood that attempts should have been made to use liquid air for the feeding of respiration apparatus for salvage purposes. A drawback encountered in this direction was that the liquefied medium could not always be prepared with such rapidity as would have been desirable.

The fact that the use of liquid oxygen for the same purpose has not so far been considered, may be mainly ascribed to prejudice prevailing in regard to the effects of pure oxygen on respiration. When Jules Verne represents Dr. Ox—one of his most famous heroes—as instigating at will the whole population of a town to revolution, merely by saturating the atmosphere with oxygen, he obviously only expresses the prevalent opinion that the respiration of pure oxygen stimulates the organism to extremes. That this opinion has so far been generally held, even by scientists, is possibly due to the exceptional influence exerted for a long time by Verne's scientific fancies.

As it is, recent experiments have shown the result of respiration to be invariably the same whether ordinary air or oxygen is used. The process taking place in the lungs, that is, the conversion of the hemoglobin of our blood into oxyhemoglobin, in fact, is a purely chemical reaction and accordingly requires a strictly given amount of oxygen, any surplus being ineffective. Excellent results have, it is true, been obtained with oxygen inhalation in medicine, but only in cases when the ventilating capacity of the lungs having become insufficient, the amount of oxygen in the air was unable to entertain that vital process. On the normal organism, oxygen respiration exerts absolutely the same effects as the respiration of air.

A Respiration Apparatus Fed by Liquid Oxygen

M. George Claude, of Paris, the well known worker in the field of air liquefaction, accordingly conceived the idea of constructing a respiration apparatus fed by liquid oxygen, thus avoiding, for instance, the so harmful variations in composition occurring in the case of liquid air, and insuring the highest efficiency attainable in this connection.

The liquid oxygen is contained in a metal tank (Fig. 1) and locked efficiently by incombustible glass wool, so that the operator may, without any inconvenience, assume any posture entailed by his work. The tank is surrounded by an incombustible heat insulator (likewise glass wool) the high efficiency of which has been borne out by practice. This heat insulating material is placed in another substantial metal tank. All the parts of the apparatus are so strong that they readily resist any mechanical strain, which is an undoubted advantage over previous designs.

The heat insulation obtained by this arrangement insures an evaporation lasting from 2 to 2½ hours. The apparatus is free from any double-walled vessel with vacuum between the walls, as these organs—while being far too delicate to handle—by cutting off any outside heat, just prevent the very purpose of the apparatus that is, the production of a lively evaporation of liquefied gas.

The oxygen supply is plentiful, the 12 liters of liquid oxygen being reduced in two hours to 1200 liters of gaseous oxygen, corresponding to a rate of 600 liters per hour, which is five times the amount necessitated by a hard manual worker. However, this abundance does not mean any waste of material; on the contrary, it affords another advantage: In the apparatus most in favor at the present time, which are based on the use of compressed oxygen, the very considerable weight of the oxygen bottles entails the utilization of absolutely the whole of the oxygen carried by the operator. So far from discharging into the open, the products of respiration, which still contain much oxygen, are made to pass over cartridges of regenerating matter, in which the water and carbonic acid are absorbed. In the Claude apparatus this costly and inconvenient complication is avoided, only the most exhausted gases (viz., those obtained at the end of each expiration) being discharged, while the breathed-out gases, not discharged, which still contain enormous amounts of oxygen, are kept surrounded by an atmosphere of fresh oxygen.

The Claude Apparatus

The vaporized oxygen does not go directly to the mask; as evaporation is a continuous and relatively slow phenomenon, while inspiration, on the contrary, is a practically instantaneous process requiring a considerable gas volume, some intermediary is obviously required. The vaporized oxygen is, to this effect, thrown out, first, into a caouchouc bag, of 5 to 6 liters capacity and inclosed in another substantial metal reservoir, and thence is supplied to the mask through a tube of sufficient cross-section. The mask

*Berlin W. 50, Regensburgerstrasse 3.

is applied on the face by a pneumatic form, insuring a sufficiently tight closure, in spite of the variations in the form of face.

A special advantage of this arrangement is that the slight depression produced during inspiration applies the mask more tightly against the face, thus absolutely preventing the entrance of any traces of vitiated outside air, whereas during expiration, the mask allows the expired air to escape into the open, when, at the end of expiration, the caouchouc bag is filled

FIG. 1. LIQUID OXYGEN TANK

both with the products of expiration and the oxygen vaporized between two successive inspirations. The most vitiated gases are thus expelled automatically, without the aid of any special mechanism, and this is why the proportion of expired gases in the bag is never inconvenient, in spite of the absence of regenerators and the use of such small amounts of liquid oxygen. This strikingly illustrates the extreme simplicity of the apparatus, which, strictly speaking, does not comprise any mechanism and thus is free from any risk of breakdown.

The following figures, therefore, will show some of the advantages claimed for this apparatus:

The compressed-oxygen apparatus which, as above mentioned, enjoys the most universal favor at the present moment, carries 300 liters of oxygen with a weight of 15 kg. The liquid-oxygen apparatus, with a weight of only 7½ kg., carries 1200 liters of oxygen, i.e., four times more, with half the weight. It allows the operator to stay at least two hours in an asphyxiated atmosphere. When considering what queer exercises the operator sometimes has to perform in the narrow galleries, at a temperature liable to rise to 35 or 40 deg. C., this reduction in the weight carried, as well as the incomparably more substantial design, will be readily appreciated.

Furthermore, the operator is supplied in the present case with gas of a pleasant freshness, whereas in the case of the compressed-oxygen respiration, the moist and warmed products of respiration greatly inconvenience the operator.

As regards, next, the liquid-air apparatus recently suggested, its weight is 11 kg. (as against 7.5 kg.), and it requires 5 liters of liquid instead of 1.5 liters. Now, apart from the inconvenience due to the weight and the increased cost, the evaporation of this considerable amount of liquid is bound to produce an enormous cooling effect which it is difficult to eliminate.

The Difficulty Lay in Producing a Sufficient Amount of Liquid Oxygen

The only difficulty in connection with the Claude apparatus lay in the way of producing sufficient amounts of liquid oxygen. With liquid-air apparatus, a very considerable amount of liquid had to be kept ready and a whole battery of filled reservoirs had to be provided for cases of emergency. According to a report from the salvage station of the Belgian state, 420 liters of liquid air distributed to 80 reservoirs would be required for each installation.

While the use of liquid oxygen in the

FIG. 2. CLAUDE RESPIRATORY APPARATUS

place of air already reduces the amount of liquid required to one-third, the inventor endeavored further to improve its working conditions by designing a more satisfactory process of producing liquid oxygen. The ordinary liquefiers, in fact, yield directly liquid air which has to be converted afterward into liquid oxygen, with a considerable waste of material. Furthermore, the apparatus used for the separating of oxygen and nitrogen require from three to four hours to get into working order, and while their efficiency in regard to the production of gaseous oxygen is quite remarkable, their output in liquid oxygen is extremely low. Now, what is required in connection with the Claude apparatus is to produce the liquid oxygen abundantly, at a moment's notice.

The very simple solution of the problem designed by the inventor in conjunction with M. Le Rouge consists of starting from commercial compressed oxygen and liquefying it under pressure by means of expanded air, yielding external work. As oxygen, owing to its relatively high critical temperature (—118 deg. C. as against —140 deg. C. in the case of air) is especially adapted for liquefaction, the device is ready for operation very quickly, liquefaction starting already after 15 minutes. Fruthermore (likewise owing to the high critical temperature) the thermodynamical efficiency of expansion is excellent, the yield of oxygen being as high as a dozen liters for 20 h.p., in spite of the low space requirements. Again, the apparatus, consisting of a simple liquefier, is far less complicated and costly than an oxygen-nitrogen separator.

In connection with the training exercises of the salvage crew, it will, it is true, be found more economical to produce liquid air and to convert it by evaporation into liquid oxygen with an output of 3 to 4 liters per hour. The same process should be used to refill once or twice per week the five or six silvered balloons which constitute the modest reserve for cases of emergency.

From an economical point of view, it will be advisable to provide a central station with apparatus as described for supplying four or five mines, which may be distributed over a range of several kilograms. The first cost of a complete installation, owing to the relative cheapness of the Claude apparatus, will be reduced to about $200.

Mr. Claude finally suggests storing the liquid air from the moment of its production to the moment of its use in simple sheet-metal cylinders insulated with glass wool. His experiments have shown the losses with a reservoir holding 20 liters to be not more than 0.7 liter per hour, which is quite negligible in the present case. There is, therefore, no objection to taking the respiration liquid in such reservoirs down to the mine.

Blaugas

The manufacture of "blaugas," a condensed gas made from waste oil, has been begun in the new plant of the Blaugas Company of America in Long Island City, near the Standard Oil works. The new American company, capitalized at $5,000,000 under New Jersey laws, has E. C. Benedict for president, and the following directors: Theodore N. Vail, Elbert H. Gary, Theodore P. Shonts, Gen. Charles Miller, Frank S. Hastings, H. B. Baruch, Howard Page and Kenneth K. McLaren.

The state of Matto Grosso, Brazil, is said to possess large deposits of manganese, near Cuyaba.

Ray Consolidated Copper Company

The first annual report of the Ray Consolidated Copper Company gives a resumé of the work done to date at the property in Pinal county, Arizona. The following is an abstract of General Manager D. C. Jackling's report dated Oct. 5, 1909:

When these mines were first purchased, it was thought that a satisfactory mill site could be acquired near the town of Kelvin. However, as the mines were developed it became apparent that as a result of the large tonnage of ore disclosed it would be necessary to plan operations on a much greater scale than that at first contemplated. The Gila river affords the only sure and adequate water supply for such large operations, and it was therefore desirable to find a site as near as possible to that stream. The country on both sides of the river, and for a distance of about 50 miles along it, both above and below Kelvin, was thoroughly inspected and it was decided that a point about 12 miles up the river and to the southeast of Kelvin was the most desirable site for the mill and smeltery and the company purchased approximately 4000 acres of land for this purpose. The site selected lies principally on the north bank of the Gila river, directly opposite the point where the San Pedro river empties into it.

The actual mill site is about half a mile from the Phœnix & Eastern Railroad, and the smeltery site is near this line. The Phœnix & Eastern is now extending its line from Winkleman, the present terminus, up the Gila river to a connection with the Gila Valley, Globe & Northern Railroad, at San Carlos, and when this connection is completed, which is promised at an early date, the company will have a direct outlet east to the Southern Pacific instead of by way of Phœnix, as at present.

Geology and Development of Mines

Since the last statement to stockholders the company has received from Spurr & Cox a geological report which finds that the orebodies consist, generally speaking, of secondarily mineralized bodies of altered schist, associated with lesser masses of granite porphyry, more or less altered, and mineralized similarly to the schist. Of the 1000 acres of mining ground owned by the Ray company, about 470 acres show indications of thorough primary mineralization, and that there is a less mineralized area of about 131 acres. The area of maximum primary mineralization corresponds in general with that of the secondary ore formation, but the parallel is not complete.

The developments have been prosecuted for the greater part of the past year by the use of 11 churn drills, in connection with a considerable amount of underground work, both in the Ray and Sharkey orebodies, although most of the underground work has been confined to the Ray section. The continuance of underground work was for the double purpose of securing ore for the experimental mill and checking the results of drilling by driving raises alongside a considerable number of drill holes.

Engineer Henry Krumb's report covering drilling operations for the month of September, 1909, shows fully developed ore in the five groups of holes being drilled to an amount somewhat exceeding 38,000,000 tons, having an average value of 2.26 per cent. copper. The total area containing this amount of ore was 95.9 acres, the average thickness of ore 114.7 ft., and the average thickness of capping 240.1 feet.

In addition to the above-mentioned quantity of ore which is fully developed, or as thoroughly as it can be by the system of drilling in 200-ft. squares, there is such a quantity of partially developed and indicated ore as warrants the assurance that the areas now being drilled will be shown to contain at least 50,000,000 tons of ore without any extensions of their existing limits. Active developments are being continued at a somewhat reduced rate underground, in preparation for mining when the new concentrator is completed.

Equipment and Operations Proposed

It has been decided to construct a concentrating plant on the site near Winkleman, of a daily capacity of 5000 tons. Designs have been practically completed for this plant, and the grading for the plant, and for the three miles of railroad necessary to connect it to the Phœnix & Eastern Railroad, are now in progress.

The topography of the ground selected for the mill site is well suited to the requirements, and the area having a desirable slope is sufficient to accommodate a plant of about 12,000 tons daily capacity. The character of the smeltery to be built has not yet been fully determined upon.

A steam-driven electric power plant, of suitable size to accommodate both mill and smeltery, will be situated about half a mile from the mill on the Phœnix & Eastern tracks. Power will also be transmitted from this plant to operate all machinery at the mine.

At the mine, preparations are being made in the way of opening up main levels and blocking out the ground for mining. A two-compartment vertical shaft is being sunk on the edge of the Ray-Parsons orebody, from which this orebody will be mined in three levels, the first one corresponding to the old 50-ft. level of the Ray mine, where several thousand feet of existing workings can be used to advantage. The inclination of this orebody is such that the three levels, which are about 100 ft. apart, and driven in different directions, will each be under the orebodies it is intended to serve, so that mining operations along the lines of any one of the modifications of what is known as the caving system may be carried on simultaneously on each of the levels without interfering with the others.

The maximum distance any of the ore from the Ray-Parsons body will have to be hoisted is approximately 300 ft., and the hoisting plant is being designed for skips of 12½ tons capacity, running in balance, and will have a capacity of hoisting 5000 tons in not to exceed 16 hours. A coarse-crushing plant will be located at the shaft, and the ores crushed to about 1-in. size before being sent to the mill.

The Railroad

The standard-gage railroad connecting Ray with the Phœnix & Eastern tracks at Kelvin, six miles in length, should be completed in about sixty days. The grading is now approximately two-thirds finished. As was stated in a former report to stockholders, a favorable arrangement has been made with the Phœnix & Eastern Railroad to transport ore from Kelvin to the mill and smeltery. This service will include hauling the ores over the company's three-mile connection at the plants, and also includes all switching, so that it will not be necessary to run the Ray Consolidated locomotives off the company's six-mile branch from Kelvin to Ray.

The experimental mill was closed down early in August, after having been in operation for about ten months at a tonnage rate varying from 100 to 150 tons per day. The results of its operation are very valuable, as indicating clearly the best design and arrangement of apparatus for the new plant. During the last period of its operation it ran on an ore of the normal grade shown by all developments, and the results during that time show a saving of about 70 per cent. of the copper contents, accompanied by the production of a 27 per cent. concentrate.

There were many features in this plant that were not well designed or arranged to effect the best saving possible, and its operations being of an experimental nature were necessarily intermittent and irregular, so that it may be expected that the percentage of recovery in the new plant will be higher than that shown in the experimental work. The grade of concentrates will be about the same.

The stock of the company has been increased 200,000 shares to a total of 1,000,000 shares, par value of $10 each, all issued or subscribed for excepting 35,350 shares, which are held for the conversion of the remaining outstanding bonds. The balance sheet of June 30, 1909, places a valuation of $5,499,800 on the property; development and construction, $867,848; and $1,285,536 as available cost.

Miami Copper Company

According to J. Parke Channing about 40 acres of the mineral ground owned by this company have been developed to date, and the estimate of ore reserves exposed by shafts, drifts, crosscuts and raises is something over 13,000,000 tons. There is not the slightest doubt that within this area there is considerably more ore actually in existence, and it is probably safe to assume that this 40 acres will produce 14,000,000 tons of ore, after allowing for losses in mining. The property of the Miami Copper Company was taken under option by the General Development Company and work begun upon it in January, 1907.

One point of great interest in the deposit of the Miami Copper Company is its compactness, ore being proved according to the report to extend from a depth of 220 ft. to a depth of 620 ft., or 400 ft. vertically; and it seems likely that this depth by no means limits the bottom of the ore. Taking into consideration this compactness of the orebody, its grade, adaptability to water concentration, and its physical character, which particularly adapts it to the cheap caving system, the property promises to be among the successful mines operating the so-called "disseminated orebodies."

As near as can be determined, the grade of this ore will be 2.75 per cent. copper, from which there can be extracted 40 lb. of copper per ton. This would give a total of 560,000,000 lb. of copper. Estimates of cost indicate that this copper can be produced for 9c. per lb., delivered at New York.

Of the 668 acres owned by the company 250 acres are strictly mineral, of which only 40 have been developed. Probably 60 acres contain nothing, leaving 150 acres with good prospects. At present the mine facilities are being taxed to their utmost in developing, and but little work in new territory is being carried on under ground. When the permanent plant is erected drifts can be extended laterally over a large portion of the undeveloped 150 acres.

Development

The mine is being developed and mill equipment erected for a capacity to treat 700,000 tons of ore per year, which should yield 28,000,000 pounds. At 13 cents this would show an annual profit of $1,120,000, or $1.87 per share. At 15 cents for copper the profit would be increased to $1,680,000 or $2.80 per share. On ore blocked out this rate could continue for 20 years.

A large working shaft has been sunk midway between the orebody and mill site to a depth of 420 ft., and a new ore extraction level has been established at that depth in the mine, midway between the 370 and 470 levels. As soon as the 420 level is in working condition the shaft will be sunk to the 570 level. The shaft itself will probably have to go about 100 ft. below the 570 level, so as to allow for the large 1000-ton pocket from which the skips will be loaded.

The ore will be mined by the caving system. The company has secured and developed two valuable water rights, one on Pinal creek and the other at the lower end of Miami wash, and in addition has secured from the Old Dominion 1,000,000 gal. of water a day.

An experimental mill has been installed and kept in continuous operation with results so satisfactory that it was decided to build a concentrating plant capable of treating 2000 tons of ore per day. The favorable topography at the mine determined the best location for this mill to be on a hill-side near the orebody. The excavation for the mill has been completed and the construction of the concrete foundations is now in progress.

The Gila Valley, Globe & Northern Railroad extension was opened for traffic Oct. 4. A smeltery will not be erected for the present. Early tests showed that the ore would concentrate 15:1, but later work seems to show as good a recovery with a concentration of 20:1. There will probably be produced daily about 100 tons of concentrates running 40 per cent. copper, which will be treated by one of the several local smelters.

Power Plant

For the purpose of operating the mine and the mill a power plant is being erected in which crude oil will be used as fuel to generate steam in three 600-h.p. boilers, with steam at 185 lb. pressure and 100 deg. superheat, used in three four-cylinder triple-expansion engines, each direct connected with a 1000-kw. alternating-current generator, producing three-phase current at 6500 volts, 25 cycles. The power house will also contain two four-cylinder, triple-expansion, two-stage air compressors, each with a capacity of 4000 cu.ft. of air. The current generated in the power house will be used for pumping water and driving the mill, together with the various shops and underground haulage. The compressed air will not only be used for operating the air drills underground, but also for operating the hoisting engines at the main shaft, the power house being distant one-half mile from the mine and mill. By the use of oil for preheating this air just before its use in the hoisting engines, it is estimated that economical results will be achieved and that the generation of power will be concentrated in one house, under the most favorable conditions for economical operation.

The number of men engaged in all classes of mining in Victoria during the year 1908 was 17,266, according to the *Queensland Gov. Min. Journ.*, Sept. 15, 1909.

The Potash Salts Situation

The fight between the Kali-Syndikat and the producers of potash salts who have been outside that combination since its reorganization, is to be taken up by the German government, according to a despatch from Berlin, which says:

The completion of contracts between the German potash mines and the American fertilizer companies at prices lower than those of the syndicate has influenced the Imperial Ministry of the Interior to prepare bills for submission to the Reichstag with the object of creating a Government control over the potash industry.

The legislation proposed would prevent the filling of orders at the prices contracted for by the Americans, who have placed orders covering a greater part of their requirements up to 1917.

The Government is taking this step, it is understood, on the suggestion of the States of Prussia, Anhalt and Schwartzburg-Sondershausen, where the potash mines are owned. The mine owners are supported in their attitude by a majority of the syndicate mines, which, during the embittered controversy among themselves over a renewal of the syndicate agreement, lost their chance to charge American buyers about 20 per cent. more for potash than German buyers pay.

The legislation in course of preparation will provide for Government control in perpetuity of potash production and sale. The Government will regulate export prices by placing a tax upon potash exported equal to the difference between the Government schedule and the prices as fixed by the mine owners when free of Government control. In order to prevent sales abroad or at home at prices below the Government figures, the legislation would place a producing tax upon potash production when it has exceeded the Government allotment.

If these measures should be adopted America, which takes about 60 per cent. of the potash exported, would be obliged to pay monopoly prices. The legislation must be approved by the Federal Council before it is submitted to the Reichstag. It will quite likely receive the support of the entire landed interest for the reason that it will tend to benefit German agriculture at the expense of a foreign country, which in this case happens to be the United States.

The American interests here are concerned over the situation and will probably make representations concerning it to the State Department at Washington. Such a course has been suggested by local representatives of the American fertilizer companies.

In the 300-stamp mill at the Alaska Treadwell a duty of 5.34 tons per stamp per 24 hours was averaged during the year ended May 15. A duty of 4.79 tons was averaged in the 240-mill.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice and Debatable Points Suggested by Articles in the Journal

CORRESPONDENCE AND DISCUSSION

Mining Conditions in Nicaragua

I have read with interest the article which appeared in the JOURNAL, July 31, 1909, under "Special Correspondence" from Nicaragua. Permit me to state that there are several English syndicates now willing to invest in the Prinzapulka mining district in the vicinity of Matgalpa and La Libertad. Many good properties are for sale. Unfortunately in this country good and cheap properties are often overlooked in the preference for the dearer ones. It does not need days, but months and possibly a year, to look over a mining district and pick out the bargains. As things stand in Nicaragua, one-half of the mines and three-fourths of the prospects are for sale. Foreign investors who buy through agents, promoters or merchant firms, here, pay nearly double the price at which they could have bought directly.

In the Rama mining district there is only one working company, the Topaz Mining Company, which owns a number of mines, an electric power plant and a cyanide plant. It is now running twenty stamps. The output is approximately $9000 per month, with a good prospect for an increase to between $12,000 and $15,000. If the other properties owned by this company were opened and operated and the number of stamps increased, the output could be largely increased. The Quisilala Mining Company is also in the Rama district. This company is installing a five-foot Huntington mill, which will soon be ready for operation. The mines are about 18 miles from the Rio Rama, which is a long distance in an ever-wet country, without roads and without people who know how to make good roads.

There are many good properties in the Rama district, and the geological formation is much superior to any other district in the country. The Rama district, by far the nearest to sources of supplies, has ample labor, and cheaper provisions than can be obtained in the Prinzapulka district. The discovery of gold dates back to long before Columbus discovered the country, and at the time of this visit the Indians showed him gold which they brought from the interior.

Another promising district on the Atlantic coast of Nicaragua is the Wawa district, where there are a large number of partially developed prospects with good ore exposed but which cannot be worked on account of lack of ample capital. The Wawa district is less accessible than the Rama mining district, but still much easier to be reached than the mines in the Prinzapulka district. Accessibility and large water power are two of the cardinal conditions to make a good mine in Nicaragua.

Spring crops have been bad this year all over the Atlantic coast of Nicaragua, and owing to the high duty and excessive profits of the importing merchants, foreign provisions are at prohibitive prices. There has been much starving and consequent sickness among the poorer classes. In the old mining town of La Libertad the death rate has been enormously high.

A mining possibility which has been overlooked, or at least underestimated by those who are looking for investments, is the black sands from Walpasixa, along Cape Gracias, a distance of over 120 miles, and whoever will take the trouble to look well into these will certainly find many very promising locations. Many of the sands derive their mineral content from the rivers which flow down from the mountain countries.

The greatest mistake an investor can make is to come out "booked," so to say, to look at one or two special mines. He will be disappointed sooner or later. Miners or prospectors without plenty of money would do well to stay away from here. They are sure to come to grief, and to save them from this I repeat this warning.

One cannot talk business in this country without asking the question, "How does the government stand toward the mining industry?" In answer to this, in most cases, the laws are very favorable. It is true that the import duties charged on provisions and other necessities are high, as well as the profit charged by the merchant. But on the other hand, machinery, cyanide, quicksilver and similar supplies are free of duty for the mines, and many provisions can be successfully grown here to save transportation and duties on merchandise imported. The mining laws are liberal and liberally interpreted by the authorities along the Atlantic coast. The only trouble is that they are not guaranteed and that the government might change them any day. But this dark cloud has its silver lining. The president and a number of the high officials of the country have recently invested heavily in mines themselves, and it is to their interest to foster the mining industry, so that an unfavorable change of the mining laws does not seem probable in the near future.

I cannot close these lines without warning investors to keep aloof from all concessions. Buy only in legitimately organized mining companies. Concessions have been the scourge of the country and have brought it to the verge of financial and moral ruin. Concessions are not worth the stamped paper on which they are written. They can be canceled any day and under any pretext. They are nothing more than a worthless sheet of paper given to a promoter, who uses it to fleece the guileless public in the United States and Europe. A. B. W.

Rama, Nicaragua, Sept. 18, 1909.

Sources, Treatment and Prevention of Malaria

The paper on malaria by Messrs. Chester and Semple, in the JOURNAL of Oct. 9, 1909, should be learned by heart by everyone who travels. It is particularly valuable to those who mine. It is to the point and is well and clearly written. In my own case, I had a dictionary handy and consulted it frequently. The editor should be reproached for not providing footnote definitions of the technical medical terms. For the benefit of the miner who is in the malarial country and whose only book may be a Kent or Trautwine but certainly not a dictionary, I offer the following:

When speaking of the blood as "anemic" and filled with "toxin" the doctor is trying to say that it titrates low and carries soluble sulphides. When he says the patients breathing becomes "loud and stertorious," he simply means that it sounds like that of the man in the upper berth across the aisle. Saying that "no diaphoresis is induced by antipyretics" sounds bad, but only means that the patient does not sweat.

Cinchonism has nothing to do with a diamond hitch or a cinch (it is pronounced sin'kon ism) and stands for the bees in your bonnet, which are sinchronous with each heavy dose of quinine. The doctor says: "Five hours after exhibiting the last dose of calomel, etc.," but he really does not mean that. It does no good to just see the dose—you must take it and show the doctor.

The suggested use of "ice, or cloths wrung out in cold water held in the hand and mouth" should be called to the attention of the entire camp the day after pay day. In fact, it is worthy of being framed and hung over the pay window in any

country, and the absence of fever will not in the least detract from its value.

Chicago, Oct. 13, 1909. COGNOS.

The First Job

Upon reading the letter of Stanley S. Roberts in the JOURNAL of Oct. 23, 1909, I was struck by his advice to the recently graduated mining student as to securing a job. This advice is sound and Mr. Roberts' recommendation is good, but to my mind the young man's first mining job or jobs should be secured before, not after, his graduation. The profession of mining engineering requires many things of the man who would follow it, and the percentage of youths entering our mining schools who are fitted by disposition or "gray matter" to practice that profession is, I believe, low.

There is an atmosphere of romance that surrounds the very word, mining engineer. It hints of adventure and travels in wild places, with the lure of treasure to be found during a care-free life. It is this hat makes mining the choice (often an unfortunate one) for young men who are totally unfit for the life of the mining man, both as a manner of living and in a business way. My advice to boys asking about the best mining school has always been: "Go to some mine in the West and get a job for a year. At the end of that time, if you still want to mine, it makes little difference which school you choose."

Further, how can a man study mining intelligently who does not know or realize the import of what he studies? A set of timber or a piece of bad ground looks entirely different in place from its pictured representation. A little such experience would prevent, too, the sad spectacle of a graduating class receiving as gospel truth the solemn declaration of a joking superintendent who informed the class that the steam pipes (to the pumps) were to supply steam heat to the men at the working faces. Much of the prestige of the Western mining schools is due to the fact that their students one and all spend their vacations as workmen in the mines and smelteries and thus not only lay a practical foundation, but also see for themselves the things about which they study.

GRADUATE.

Denver, Colo., Oct. 18, 1909.

Utilizing Blast Furnace Gases at Gary

In the JOURNAL of Jan. 2, 1909, is an interesting account of the utilization of blast-furnace gases at Gary, and I beg to call attention to an error of engineering practice that seems to occur in the cleansing of the gas, if I correctly understand the description. The article states that "the gas from each furnace passes into the two downcomer pipes which lead into a reservoir called the 'dry-dust catcher,' from which the gas passes into another large pipe which leads upward some distance to increase the quantity of dust dropped."

When the gas is rising vertically it will retain all particles so small that their rate of fall, in still gas, would not exceed the rate at which the gas is rising. The best result would, therefore, be obtained by having the gas flow horizontally, preferably in a flue with rectangular section, at the bottom of which should be a grating through which the fine-dust particles could fall into a perfectly still atmosphere. From this dust reservoir below the flue the dust could be removed intermittently by means of a screw conveyer without permitting any escape of the gas, as the screw conveyer would be at all times buried beneath the dust and the dust itself would make a sufficiently good seal to prevent the escape of gas.

In this way all particles of dust of such size that they could fall a distance equal to the diameter of the flue during the time that would elapse while any given dust particle was being carried by the stream of gas from one end of the flue to the other, would have a chance to fall into these dust bins beneath and a greater degree of separation would thus be obtained than could be obtained in an equal length of flue in which the gas was rising. Mechanically speaking, the problem is the same as that of removing traces of moisture from natural gas. The old-fashioned vertical water catches give the minimum result in proportion to the expense. The horizontal water catches, which I have used for 20 years, give a maximum separation of water, in a minimum of space and time and with a minimum expense.

GODFREY L. CABOT.

Boston, Mass., Oct. 27, 1909.

Copper Refining in Australia

Referring to the operations of the Electrolytic Refining and Smelting Company, of Australia, and the illustration of one of its furnaces in the JOURNAL of Sept. 11, 1909, the item in question was in error in stating that the starting of the Port Kembla works inaugurated electrolytic refining of copper in Australia. The first electrolytic refinery was erected at the Wallaroo smelting works, South Australia, by myself and was working in the year 1891. The second was erected and worked at Lithgow about the year 1900, by Mr. McMurtry, previously my assistant at Wallaroo.

T. C. CLOUD.

London, Sept. 27, 1909.

The Bismuth King mine, in Sinaloa, Mexico, has a large deposit of complex ore carrying 2 per cent. in bismuth. Attempts to smelt the ore and save the bismuth have not been successful.

"Rush of '49" Celebration

The "Rush of '49" celebration, which began at Stockton, Cal., on Oct. 26, is a unique revival of the old days. Roaring Camp is a city of log houses that has been erected in the public square as typical of the camps which dotted the California gold fields when the overland trails were filled with caravans of prairie schooners. It is at the foot of a range of painted mountains down the sides of which Gold Gulch creek foams through a stage cañon. In the background are the shacks and tents where the miners live, the dance hall, the saloon, the jail, the office of the *Gold Gulch Gazette*, the gambling den, and the theater with its Mexican fandango.

In the creek miners wash real gold from real pay dirt. The opening day was filled with a long program of exciting incidents, including a hold-up, an attack by Indians, a rush for a new discovery of gold, and a riot in the Red Dog saloon. The dress of the people has changed to that of the "Forty-niners." All are wearing "guns." Pioneers are arriving from all parts of the State. Joaquin Miller will visit the city during the "Rush."

Alaska-Yukon Boundary Line

The work of delimiting the international boundary line between Alaska and the Canadian Yukon has been continued throughout the fieldwork season of the current year and good, though necessarily slow, progress made. The line southward from the crossing of the Yukon river has been marked by permanent aluminum-bronze monuments.

The work accomplished in 1909 includes the projection of the line northward from Yukon river, and southward to the Natazhat river from White river, the terminal point of the 1908 operations; also the continuance of the triangulation and the topographic survey, and the placing of permanent monuments northward from White river.

This boundary work is being done by United States and Canadian survey parties working independently, but each is accompanied by a surveyor from the other party whenever identification of particular points has to be made.

The deposits of mica in the Big Bend of the Columbia section of British Columbia, are at an elevation of 7000 to 8000 ft. The bands of mica schists are described as containing segregations of quartz from 4 to 100 ft. in width and these carry sheets of mica up to 2 ft. in length. Near the surface the mica crystals are iron stained, but below the zone of weathering, bright and clear. Mica crystals were found by a recent exploring party along a distance of 2½ miles. Access to the district is as yet only by trail.

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*Illustrated.

Tin Mining in Malaya

The statistical position of the tin industry of the Federated Malay States (Perak, Negri Sembilan, Selangor and Pahang) is unsatisfactory as compared with that for the same period of last year; the anticipation of increased production has not been realized. For the half year ending June 30, 1909, the production was 22,930 long tons against 24,650 in the corresponding semester of 1908. It was thought that the amalgamation into the British Empire of the Siamese Protected States would have caused increased returns, but up to the present, the expectations have not been fulfilled. The newly acquired territories do not appear to be rich in minerals and transport difficulties have to be faced, the principal means of communication with the interior or supposed mineral area being by means of rivers which are not always navigable. The sources of the principal rivers are in the mountains which intersect the peninsula and in the dry season there is seldom more than a few feet of water, while a few days rain causes them to rise to flood levels; the rise and fall have been known to be as much as 20 feet.

Tin mining in Malaya has for the past been carried on principally by Chinese, who even now, are responsible for about 85 per cent. of the output, but the alluvial deposits on which they have been mining are fast being depleted and the future of the tin industry will depend upon dredging low-grade ground or hydraulicking, both of which methods are being introduced by European and Australian miners with a certain amount of success. Lode mining is still in its infancy.

The price at which tin can be profitably produced is about £150 per ton, but as prices are governed by the demands of London and New York, the miners have little or no voice in fixing quotations. There was some sort of an attempt, just before the "Great Tin Slump," made by Chinese to manipulate the tin prices, but it ended in complete failure and led to a disturbance of trade from which it has not as yet recovered.

An erroneous idea prevails that the Chinese are wealthy and can in consequence rig up the market; but in fact their principal source of finance is the Indian money-lenders (chitties) whose charges for accommodation are so heavy that whatever profits are made in mining or trade are absorbed by them. The European banks do not encourage mining enterprise by accommodation or otherwise. The alleged profits made on mining can, therefore, be considered to benefit the Indian money-lender more than the bona-fide miner.

The labor question has not lately given any trouble, for although there has been a shortage of 36,000 native miners, it has not told materially on the output for the past year, but rather has increased the output by about 40,000 piculs (one picul is equivalent to 133⅓ lb.)

The opinion in Malaya is that the future of the tin industry will depend upon the American market and the production of other parts of the world. The price will evidently be regulated to a large extent from New York, inasmuch as the United States consumes upward of 35 per cent. of the world's production of tin. The bogey of fabulous eastern speculators may be exploded for there is not sufficient capital out there to make any firm stand against the interests of the West and the actual producers are living a hand-to-mouth existence, being forced by circumstances to sell their products at the daily market price. From past experience the Chinese will not hold stocks for speculation and, therefore, there will be no great likelihood of stocks accumulating in the East.

The product of the tin mines is sold in the form of ore to Europeans who have large smelting works at Singapore and Penang and the refined tin is put into the market from there. The Chinese do little or no smelting and in the few instances where smelting is done by them, the ingots have to undergo refining in the Colony. The charge for smelting amounts to about $25 per 2240 lb., the dollar being worth 2s. 4d. The export duty on tin or tin ore works out to about 13 per cent. *ad valorem* and is based according to a sliding scale on the price ruling on day of export. No tin ore may be exported out of the Federated Malay States except to the neighboring Colony and any quantity sent outside is subject to a surtax of $30 a picul in addition to payment of the ordinary duty. It was the imposition of this surtax that prevented the importation of tin ore from Malaya into the United States, where the smeltery of the International Tin Company, at Bayonne, N. J., remains idle, having never been put in operation.

The Proposed Mineral Taxes in Great Britain

The new mineral rights and duties included in the British budget have been again under discussion in parliament recently. The original proposals of the chancellor of the exchequer have been considerably changed or modified since the introduction of the budget in the early part of the year. The taxing of "ungotten" minerals has been happily dropped as an unworkable system of taxation and a tax on royalties and mineral wayleaves substituted. The amount of this tax is to be at the rate of 1s. for every 20s. rental value. In the case of mines worked under a mining lease, the amount of the tax can be determined without difficulty, but where minerals are worked by the owner the valuation of the tax is not so simple. In this case the tax will be claimed on the estimated rent that the proprietor would have received if his property had been let on lease. The assessment will be made by government commissioners.

The principal arguments brought against the tax were that the burden would ultimately fall on the industry, which in many cases was not able to stand it, and not on the landlord; and further, that as no definition was given of the term "minerals," there would be a great deal of interference with mining business without adequate return to the exchequer.

In order to narrow down the application of the tax it has been agreed that common minerals such as clay, gravel, sand and chalk are to be excluded from the general term "minerals." Stone is at present dutiable, though the chancellor has stated that if he finds it possible to draw a distinction between ordinary road stone and more valuable stone like granite, he would be prepared to consider the exclusion of the less valuable material. A proposal to exclude all minerals worth less than 4s. a ton was rejected by the government. Besides the mineral-rights duty there is to be an increment-value duty, that is, a duty on any increased value that a mineral property may acquire in the future. The chancellor of the exchequer himself admitted that the budget was complicated, and said that while the increment tax would be easy to calculate in the case of a sale, it would be almost impossible to do so in the case of a lease. It was for this reason that the increment duty was imposed in the shape of an annual tax, the charge being one-fifth upon the difference of the original site value and the rents or the royalties in any given year.

An example as to how the calculation of the tax would work in practice was given as follows: Suppose a mineral property were valued at £12,500; that would be divided by 12½, the number of years purchase, giving £1000 a year as the annual value. Again, assume that the owner leased the property for a royalty of 6d. per ton and a dead rent of £2000. The first year he simply drew his dead rent, the royalties not reaching £2000. Accordingly £1000 was deducted from the £2000 and the increment of that year was arrived at, upon which the government duty was one-fifth. The next year the royalties became, say, £3000 and £1000 is deducted. The increment is therefore £2000, of which the government takes one-fifth. If the royalties went to £10,000, the government would take one-fifth of £9000. As pointed out in the debate, this increment duty, in spite of the official explanation given, bristles with difficulties and seems likely to bring those who are the owners of minerals, as well as the unfortunate officials whose duty it will be to collect the tax, into the lunatic asylums.

The Broken Hill Proprietary

In its report for the first half year of 1909 the Broken Hill Proprietary Company congratulates itself that because of the labor strike it was able to operate only one month of the semester. The ore reserves of the mines remained practically intact during a period of low metal prices, and at the present time it is not the intention of the directors to reopen the mines until justified by an improvement in prices for the metals which will enable the company to pay the wages set out in the award of the arbitration court. The directors reckon that the men sacrificed over £265,000 in actual wages, while the cost to the company, including arbitration-court expenses, was £33,600. The transportation companies lost £160,000, of which the larger proportion means wages, while moreover the miners' union raised by levy and contributions over £45,000.

"All of this loss could have been avoided," say the directors, "had the men agreed to the proposal of the company to continue work at the wages prevailing in 1906, and if the Federal Court awarded a higher rate, such would be paid to them as from Jan. 1, 1909, the amount involved being held in trust for their account. This offer was declined. The directors of the Proprietary company feel that their experience with the arbitration court has not been such as to inspire confidence in that tribunal. When the company's operations were suspended last January, the number of men employed was 4427. At the present time the number is less than 2000. It appears that whatever may be the humane considerations of the principle of a "living wage," the employer of labor cannot be compelled to pay more than he can afford to. Natural laws, harsh as may be their operation, are always bound to prevail."

Commercial and Official Scrap

There is often a difference between official and commercial definitions, which may lead to curious results when enacted into law. In the new tariff law a duty of $1 per ton is provided on scrap iron and steel, but the law goes on and defines scrap iron and steel as that "only fit to be manufactured by melting." Now, in the commercial sense scrap includes a wide range of material, including wrought scrap, which is worked up into blooms, bars, plates and other material. Questions at once arose under the new law, which were referred to the Treasury Department. The decision is in accordance with the letter of the law; that is, nothing is scrap unless it is to be remanufactured by actual "melting," or reduction to a liquid form. If it is only subjected to heat and remanufactured by rolling or hammering, it is not legally scrap.

This limits scrap in the tariff to what is known in trade as cast scrap and to the steel scrap used in making open-hearth steel, as those materials are actually melted. The large class of materials known to trade as wrought scrap and by various other names, may be technically and commercially scrap, but not officially. Congress has left it without a name, and has made no provision for it anywhere that we can find in the tariff law—unless, indeed, it comes under the head of "junk," which is on the free list. Another decision may be needed to settle the status of this officially deserted and abandoned "scrap." If it be neither scrap (officially) nor junk, we wonder what it can be.

A New Scheme to Hook Suckers

An Ex-Convict Conducting an Elaborate Campaign to Sell Mining Stock at Greatly Inflated Value and Enormous Profit to Himself

ELY CENTRAL COPPER CO.

A shameful attempt to inveigle the public into a mining gamble against long odds is being carried on from New York. This is the attempt to sell the stock of the Ely Central Copper Company, which is being advertised upon an extraordinary scale. The leader of the ring that is conducting this operation is a man of unsavory record; of a record so unsavory that he has previously served time in prison. The ring comprises other persons who expect to profit from the deception of the public, and a variety of puppets, stalking horses and stool pigeons who are manipulated by the ringleader. The operation is a blow to honest mining. We speak in behalf of honest mining. It is time that a halt be called to these bloodsuckings of the public.

In the JOURNAL of Oct. 12, 1907, W. R. Ingalls, the editor, in writing about the mines of Ely, said: "The Ely Central was widely advertised as possessing a large area of land directly adjoining and between the two great mines of the Nevada Consolidated. The orebodies of the latter lie flat and are of unknown extent. What was more plausible than the argument that they might connect through the Ely Central property? Doubtless the promoters advanced that argument in good faith, but with ignorance as to the geological conditions. As a matter of fact, the area of the Ely Central company between the Eureka and Ruth mines is limestone and rhyolite, chiefly a large flow of the latter. . . . . The Ely Central has done a good deal of drilling in the rhyolite, but has not yet discovered ore so far as there is common information. . . . . The three big companies are the only ones at Ely which have "developed" orebodies. There is nothing else at Ely which is more than a prospect. Among them there is little evidence of activity in exploration, although the orebodies of the kind they are especially seeking are capable of location by the cheap and effective method of churn drilling."

Since the writing of the above there has been no substantial change in the condition at Ely then referred to. We called attention to the absurdity of the claims of the present promoters of the Ely Central Copper Company in an editorial in the JOURNAL of Oct. 9, 1909. This warned our own readers, but the great mass of the gambling public has continued to furnish sport to the leeches.

INAUGURATION OF THE PRESENT SCHEME

George Graham Rice, alias Simon Jacob Herzig, after an unsavory record in the East and a stormy career in Nevada, casting about for a new game, hit upon Ely Central. With the keen perception of an artist in his line, he grasped the great possibilities of advertising to suckers ignorant of the facts the shares of this company owning property between and adjacent to the two groups of the Nevada Consolidated, a company that was just making good in most brilliant fashion.

Rice, or his agents obtained options upon some remaining treasury stock of the Ely Central at about 50c. per share, and also obtained options on certain private holdings at various prices, in all cases for small sums in comparison with the recent quotations. In the aggregate Rice is believed to hold options on about 880,000 shares. He also purchased some scattered lots.

THE RING

About a year ago B. H. Scheftels came to New York and organized B. H. Scheftels & Co., with offices in the Edison building. In 1902 he established a brokerage business in Chicago and fell in with Rice by marketing stock of some of the Nevada wildcats of the latter. He removed to New York early in 1909. Rice himself is of such evil reputation that he cannot appear openly in any "business" that he is conducting, and consequently requires a figure-head like B. H. Scheftels. The latter made his debut in New York in connection with the operation in Rawhide Coalition, one of Rice's former affairs, which was a notorious and unsavory feature of the curb market last winter. After that fiasco the Ely Central business was taken up.

Along with Rice and Scheftels is Nat. Goodwin, the actor. This worthy appears on the letterhead of B. H. Scheftels & Co., as vice-president of that corporation. Previously, Goodwin was associated with Rice in the Nat. C. Goodwin Brokerage Company, of Reno, Nev., and in the Rawhide Coalition concern.

The ring has a tailing of followers among the disreputable brokerage firms of New York, who speak favorably of Ely Central in their "market letters" for reasons that can be left to the imagination.

RICE'S PAST RECORD

The life story of George Graham Rice by reason of frequent, successive and explicit exposures published in numerous of the reputable newspapers of Nevada, Denver and New York, has become very well known. It is of public record that as Simon Jacob Herzig, the name which his honorable parents gave him, Rice was in April, 1890, at a very early age, convicted of larceny in New York and sentenced to the Reformatory at Elmira, N. Y., where he was detained, under the official designation of "No. 4018," until September, 1892. In 1895, only three years after completing the sentence for larceny, he was convicted before Recorder Goff in the city of New York of forgery and sentenced to six years in the State prison at Sing Sing, where he was designated "B-516." This second penal sentence was finished in 1899, owing to the customary commutations, and Herzig, afterward by his own choice to be known as "George Graham," or "George Graham Rice," began his career in higher(?) finance.

He became identified with the horse-racing game in and about New York. He advertised as a "tipster," and later was president and general manager of the notorious Maxim & Gay Company, race-track tipsters, whose operations were investigated by the U. S. post-office authorities with the result that a fraud order was issued against the company. He published a racing paper, and was actively interested in the race-tip business under various names and connections in several cities.

Rice appeared in Nevada in the early stages of the mining-stocks campaign which followed the Tonopah and Goldfield discoveries. Here he became busy, usually behind the scenes, and was connected with the L. M. Sullivan Trust Company, of unsavory memory.

"THE MINING FINANCIAL NEWS"

Rice brought with him from Nevada the remnants of a newspaper organization. When his headquarters were at Reno he conducted the "Nevada Mining News" apparently for the purpose of furthering the schemes that he then had in hand. Associated with him as editor was one Merrill A. Teague. In New York there was established the "Mining Financial News," which purports to be published by the Mining Share News Bureau, Incorporated, of which W. T. Seagrave is president and treasurer, Harry Hedrick, vice-president, Julius Levy, secretary, Merrill A. Teague, editor, and Harry Hedrick, associate editor. This paper carries under its title on the editorial page the legend, "The Wall Street Authority on

New York and Boston Curb Stocks," and states "this newspaper does not accept advertisements." It is published every Thursday. The issue of Oct. 28, 1909, bears the notation, "Vol. I, No. 35."

The "Mining Financial News" publishes eight pages of matter weekly. This matter consists chiefly of articles booming Ely Central. Many of these articles are signed by the names of inconsequential persons. Others are signed by names which are believed to have no personal existence. Under some of the latter George Graham Rice himself is believed to write. B. H. Scheftels formerly contributed the weekly articles about the New York curb market, but lately the "Mining Financial News" has simply quoted the market letters of B. H. Scheftels & Co.

Among the other features of the "Mining Financial News" is a dope sheet, printed in display type, entitled "New York Curb Stocks," giving tips, "What to buy and what not to buy." At the top of the list, in the largest type has appeared weekly the "One best buy: Ely Central." Among the "best buys" are Bovard Consolidated and Rawhide Coalition!!

Throughout this precious paper is scattered news about legitimate mining companies—an old, threadbare scheme to entrap the unwary. In this case the most emphasis is naturally placed upon what is being done by the Nevada Consolidated, and the mineral possibilities of the Ely district are painted in the most glowing colors. By more or less direct statements it is sought to convey the impression that the highest officials of Nevada Consolidated endorse the mining prospects of Ely Central. This, however, is quite contrary to fact. Great effort is made to cause "Mining Financial News" to appear as a real newspaper, and so successful has it been in this as to develop a bona fide subscription list of considerable magnitude, but the number of copies circulated to subscribers is less than a tithe of what is printed for gratuitous distribution to possible suckers.

In spite of the pains to disguise the character of the publication, however, it requires far less than the perception of a trained journalist or of a mining engineer to discover that its one purpose of existence is to boost the affairs of B. H. Scheftels & Co. in general and the Ely Central deal in particular.

It is the common belief that the "Mining Financial News," ostensibly published by the Mining Share News Bureau, Inc., is really published by B. H. Scheftels & Co. Its office is in the Edison building, on the same floor and adjacent to the office of B. H. Scheftels & Co. Harry Hedrick, who appears as associate editor of the "Mining Financial News" is a clerk in the office of B. H. Scheftels & Co.

The Prostitution of the Daily Press

The "Mining Financial News" is far from being the only agent in furthering the Ely Central campaign. B. H. Scheftels & Co. publish daily and weekly market letters that are sent regularly to a large list of "come-ons." These letters are of the same general character as the market reports that appear in the "Mining Financial News." Sufficient is said about the reputable mining companies to give the letter a guise of plausibility, but the biggest part of the space is devoted to Ely Central and the slogan that is reiterated in capital letters is "Buy Ely Central!"

The news letters of B. H. Scheftels & Co. have been printed in two of the New York daily papers that have been willing to prostitute themselves in this way. These papers are the *Commercial* and the *Tribune*. In the *Tribune* and the *Commercial* these letters have been run in in connection with news matter in such a way as easily to mislead an unwary reader as to their real character. The worse offender by long odds, has been the *Commercial*, which has not only published the market letters of B. H. Scheftels & Co., but also has printed in its real reading columns a variety of squibs about the Ely Central Copper Company that have been calculated to excite interest in that concern. The "Mining Financial News" is printed in the *Commercial's* shop. The *Herald* and *Press* have accepted advertisements of B. H. Scheftels & Co., but so far as we are aware these have been published in undisguised form. Other papers have declined this advertising. We know specifically of one reputable paper, to which perhaps the money would have been more of an object than to some of the greater, that declined a $15,000 advertising contract offered by B. H. Scheftels & Co., because it would not prostitute itself even in that way.

On the Curb Market

Having framed this elaborate system the next step was naturally to create an active, or an ostensibly active, market for Ely Central on the Curb. This could be done, of course, by the usual methods. It was important that the transactions in this stock should be mentioned in the market reports of the daily papers and herein several were of assistance. In about a month the price for the stock was run up to $3½ per share, which is about the quotation at present, and during the last week or two the reported sales have amounted to something like 30,000 shares per day. The rapidity with which the price has been boosted does not gibe with the statements and prognostications that we quoted in our article of Oct. 9. We understand, however, that the Rice-Scheftels options must be exercised in part on Feb. 1, 1910, and in full 60 days later, wherefore the necessity for haste is evident. Also the campaign is expensive. The cost of the "Mining Financial News" has been reported to us from a well informed quarter as $2000 per week, and of the Scheftels letters as $600 per week.

What proportion of the sales on the Curb are "wash" is known probably to no one but the ring. That matter may be left to the imagination of those who are versed in Curb-market affairs. Undoubtedly there have been a good many sales of *bona fide* character. In the first place the ring had to take up a good deal of real stock from Philadelphia, Baltimore and perhaps from Ely where the tired holders of what they considered a "dead one" welcomed the creation of a market as nothing less than a wind-fall. Later on there has been execution of orders from the suckers entrained by the wash sales. Of course, this is what wash sales are for. We understand that the suckers have been biting freely and that checks by mail have been showering into the office of B. H. Scheftels & Co. like snowflakes in winter. However, under the circumstances that we have recited it does not necessarily follow that these orders have been executed in the Curb market. The ring has had some of its own stock and some treasury stock that it could deliver, and some of the optioned stock is said to have been released, but not the whole of it.

The Bond Issue

When the Rice crowd got the contracts on Ely Central stock there was in the treasury of the company only a few thousand dollars and about 75,000 shares of the stock. This treasury stock was optioned to Rice for 50c. per share, thus providing for only $37,500 for the company. Obviously this amount was not sufficient to explore and develop the property and the plan of an issue of bonds and additional stock was brought up. This plan provided for a new stock issue of 400,000 shares and a bond issue of $600,000, the bonds to be convertible into the new stock at $1.50 a share for the stock. This stock and bond issue is still pending. Even if money were supplied to the company through this bond issue the amount would be utterly inadequate to finance such a mine as the promoters represent Ely Central to be.

A Professional Report

The idea of a bond issue furnished a pretext for sending out a mining engineer to make a report that could be widely advertised. William A. Farish was selected for this job. Immediately the "Mining Financial News" began to sing paeans about Mr. Farish. During the time of his journey to Nevada, his sojourn on the ground, the composition of his report and its consideration by the board of directors the readers were kept on tenter hooks. The entire staff of the "Mining Financial News" and all of its contributors, real and imaginary, united in wondering what would be the nature of this crucial report and in whispering, nay

shouting, that if it proved to be favorable the stock would immediately go up, up, up. The Ely correspondent used to telegraph daily that Colonel Farish had walked over the ground and expressed his pleasure, etc. When the report was made public it was characterized as "deliriously favorable." Here is the report as published in the "Mining Financial News" of Sept. 23, 1909:

REPORT BY COL. WILLIAM A. FARISH ON THE PROPERTY OF THE ELY CENTRAL COPPER COMPANY

To the President and Stockholders of
Ely Central Copper Company.

Gentlemen:

In accordance with directions, I have examined your property, namely, the Ely Central Copper Company's group of mines, and annexed you will please find my report.

Yours very respectfully,
(Signed) WM. A. FARISH.

ELY, Nevada, Sept. 6th, 1909.

THE ELY CENTRAL COPPER COMPANY'S PROPERTIES, consisting of thirty mining claims, containing 489.96 acres, are located in the Robinson Mining District, White Pine county, Nevada, about seven miles from the town of Ely, covering a portion of the celebrated Copper Flat.

For the relative position of the claims to each other, and to contiguous mining claims, I beg to refer you to the ground plan map of the district, and also the ground plan map of these mines showing such mining property as lie adjacent to them, accompanying my report and forming a part thereof.

It will be observed by an examination of the map referred to that the property extends across a portion of the mineral belt in a northwesterly and southeasterly direction in an irregular shape.

GEOLOGY

The geology of this district is so well understood that it is not necessary in this report to give a detailed description of it. Suffice it to say that the country rock consists of porphyry and limestone, which is traversed by numerous ore-bearing dykes having strikes in a general easterly and westerly direction. The greater number of these dykes and veins are south of the developed portion of the district. There are also numerous fault fissures and veins, some small, and others of considerable size, traversing the district in a northerly and southerly direction, showing conclusively that the country has been subjected to great dynamic disturbances of deep seated origin, the effect of which has been to crush and brecciate the intervening country rock between the different dykes and fissures referred to, thus making it possible for the copper solution to penetrate them and precipitate their values where the conditions were favorable for such a result, thereby making the flat or horizontal deposits which are now being worked so extensively by several of the operating mines.

There is also an enormous flow of rhyolite which covers a good portion of the territory owned by this company, the extent of which is shown on the ground plan map. This rhyolite is of a more recent age than the general formation of the coutnry and is non-mineral bearing, except the lower or deeper portion of it, which comes in direct contact with the underlying mineral-bearing porphyry, where it contains native and red oxide of copper, which must have been caused or precipitated from the gases and fumes which must necessarily have been generated by the overflow of rhyolite in its molten state over the pre-existing mineral-bearing porphyry.

Judging from the dip of the rhyolite in an easterly direction as is shown in the steam shovel pit, the greatest depth or thickness of this overflow covering your ground is probably about four hundred feet in its deepest place.

DEVELOPMENTS

Near the southern portion of your property, or, more properly speaking, that portion of it lying in a direct line between the steam shovel pit of the Nevada Consolidated Copper company on the west and the Star Pointer shaft and workings of the same company on the east, has been partially developed by these workings. That is to say, that whereas there has been no development work upon your property within the area between the above works, we take but little risk in assuming that the deposit will extend through your ground. As a mineral-bearing porphyry is known to be very thick, there is reason to believe, or to expect, a thinner layer of commercial ore under the rhyolite than exists in either of the workings of the Nevada Consolidated Copper company mentioned.

As near as can be judged, the width of this horizontal deposit in a northerly and southerly direction, the strike being east and west, is about twelve hundred feet as far as developed by the steam shovel pit, and the average length through your ground is about eighteen hundred feet. The thickness of the deposit of commercial ore is two hundred feet, as has been demonstrated by the workings referred to of the Nevada Consolidated Copper Company. That would give a block of ground (should it prove to be of the same width on the east side of your property as it is in the steam shovel pit) of eighteen hundred feet in length by twelve hundred feet in width and two hundred feet thick.

On the two "Tutwiler" claims there are several small, shallow shafts and a large open cut within a distance of a few hundred feet of each other, all of which show some rich copper ore. The rich copper ore streaks seem to have a strike a little south of west. Good ore is also found in the "Intervention," "Juniper" and "Rex" claims in the small shafts and openings made upon them. None of them have reached the sulphide ores. The country rock in which this ore is found is broken and crushed, and that portion of the property commencing with the "Tutwiler No. 1" and extending in a westerly direction to the "Puritan" claim, belonging to the Cumberland-Ely Copper company, is well worthy of prospecting by means of drilling. On the "Puritan" claim two drill holes were sunk about five hundred feet apart. The overburden, or waste, is about thirty feet thick when a deposit of ore was penetrated by the drills, which proved to be about two hundred feet thick and which gave an average value of about two per cent. in copper, besides the gold and silver, and as the territory which I recommend to be prospected by drills lies in a direct line between the "Puritan" and that portion of the Coppermines company's property which has been prospected by drilling, and is said to have developed a large body of ore about two hundred feet in thickness and of an average value of three per cent. copper, besides gold and silver, makes this territory prospectively very valuable, for should the overburden prove to be of no greater thickness than is shown by the drill holes on the "Puritan" ground already mentioned, the ore could be mined by steam shovels cheaper than any other property in the district now opened; consequently, a lower average grade of ore than is now being mined would give very large net returns if mined and reduced on a large scale.

My information regarding the results obtained in the Coppermines company's property, or that portion of it referred to above, I consider reliable.

A vein or fissure traverses the full length of the "Clipper" claim. This fissure is exposed in the railroad cut as shown on the map, at which point it is one hundred and ninety-five feet in width. It carries a great deal of iron and shows in places considerable copper oxide of high grade. This vein dips to the southwest at an angle of about sixty degrees from horizontal as near as can be determined. It has been developed in the "Clipper" claim by several old shafts from which very rich ore was taken and shipped by the early owners. This vein is traced to the south end of the "Clipper" claim, at which point it is overlaid by limestone. The limestone overlying it has been fractured and seamed in many places, and more or less copper can be found upon it extending as far northwest as the "Peyton" claim from which considerable surface ore was extracted. Ge-

ing in a southerly direction the limestone becomes very thick. I consider this vein prospectively very valuable and would recommend the sinking of a vertical shaft at a point shown on the map about three hundred feet west of it. This shaft would serve to prospect the country rock to a depth of five or six hundred feet before it would enter the vein. My reason for believing this vein very valuable is that all exposures made upon it, as stated, show very rich carbonate copper ore in bunches and seams. The mass of the vein, however, has been leeched of its copper contents by percolating water; consequently its value will not be determined until water level has been reached.

The "Josie" and "Monarch Fraction" veins are shown upon the ground plan map. They form a junction upon the "Monarch Fraction" claim, at which place there is considerable old workings from all of which quite a quantity of high-grade ore was extracted and shipped by former owners. On the "Josie" claim, belonging to the Nevada Consolidated Copper Company, there is an old incline shaft from which a good deal of high-grade ore was taken. The same general description of the "Clipper" vein can be applied to this vein also as well as the "Monarch" vein. On this last named vein a good deal of ore was taken from the old works and shafts made by former owners. I consider both these veins—that is, the "Josie" vein and the "Monarch" vein—as very valuable, and would recommend the sinking of vertical shafts for their development to water level to be located as shown on the map, namely, about three hundred feet west of the veins. These shafts, like that of the "Clipper" vein, would prospect the country rock before entering the veins on their dip. All these veins should, and will, in my opinion, carry very high-grade ore after reaching the sulphide belt at water level. The ore will be self-fluxing and, consequently, will be sent direct to the smelters without any preliminary treatment in concentrating mills.

On the "Chispy," "Quartette," "Wabash" and "Tip Top No. 2" claims there are several very large dykes crossing them in an easterly and westerly direction. They are all mineral bearing, and it is not improbable that in depth many valuable ore chutes may be developed in them.

Assured Ore Reserves

The only actual ore reserves at all developed upon the property is contained in that portion lying between the steam shovel pit and your eastern line going toward the Star Pointer shaft, which, as already stated, is eighteen hundred feet long by twelve hundred feet in width and two hundred feet thick. Should these dimensions be maintained on full development through your ground, they would give the following results:

1,800x1,200x200=432,000,000 cubic feet, divided by 13 cubic feet for a ton of ore gives 33,230,769 tons.

Whether on full development the above dimensions will be maintained or not (and I am impressed that they will be), there is no doubt whatever that the area under discussion will contain a great many million tons of commercial ore.

Prospective Values

The prospective value of the property consists of the following:

The possibilities of discovering a large area of steam shovel mining ground extending from the "Tutwiler" claims on the east to your western side-lines, of the existence of which there are many indications, as cited in the body of this report, and also in a southeasterly direction from the "Tutwiler" claim toward the Star Pointer shaft.

The three fissure veins, namely, the "Clipper," "Josie" and "Monarch," should, and I believe will, all develop at water level into big producers of high-grade direct smelting ore.

The great dykes or veins which cross the southern end of the properties may develop at depth into valuable mines.

Cost of Producing Copper

I consider it of vital importance, in order to obtain the greatest possible net results from your mines, that your company own your own reduction works and equipments, including your own railroad, for handling the overburdens and the ore from mines to reduction works. With such ownership you will be absolutely independent of all local mine railroads and reduction works, and be able to mine and produce copper from a lower grade ore than is now being produced in the district. Basing my estimate on such ownership, the cost of producing copper from mine to bank should range from six to eight cents a pound, and, should the area between the "Tutwiler No. 1" claim and the western line of your property and from the "Tutwiler No. 1" claim going toward the Star Pointer shaft, develop into a steam shovel proposition, of which, as stated, there is a possibility, the cost from this portion of the property should not exceed five cents a pound.

Conclusions

There is enough ore practically assured from present developments to make of this a large mine, and the prospective values are such that on full development they should, and in my opinion will place this property in the rank of the largest and best dividend payers (of the same acreage) now being worked, if ably managed and properly equipped as stated above.

(Signed) WM. A. FARISH.

ELY, Nevada, Sept. 6th, 1909.

We pass over the geological part of this report, that subject having already been treated very well by Professor Lawson. It is to be noted that Mr. Farish says explicitly that there has been no development work in that portion of the Ely Central that lies between the two groups of the Nevada Consolidated; however, he says there is but little risk in assuming that the deposit will extend through the Ely Central ground. No mincing words about that! Nor is there much of any hedging about the remarkable estimate of the "actual ore reserves" in a stretch of ground 1800 ft. long in which "no development work" has been done. Bosh! We do not need to tell our readers, but may say it for the benefit of the public, that *mines* are not measured in that way. As for the remainder of the property treated in this report description is confined to meaningless generalities, such as "some rich copper ore," and "a vein 195 ft. wide" which "shows in places considerable copper oxide of high grade," etc. It is unnecessary to comment further, for to the intelligent reader this report speaks for itself.

Facts About Ely Central

The southern portion of the Ely Central property lies between and adjoins the two groups of Nevada Consolidated. The northern portion bends around to the north of the Eureka group of Nevada Consolidated. Broadly speaking the northern portion shows the Arcturus limestone of the district. In this limestone at various places in the district there is a small mineralization as has been known and tested during the 40 years of the history of the district, never with any profitable result. This mineralization consists of small sheets of ore, for the most part distributed along the planes of bedding in the limestone, connected with narrow and irregular vertical veins, at no great distance from which the sheets pinch out. *These ore deposits are not commercially valuable.* The Ely Central has some deposits of this character in its limestone area and within the last two or three weeks it has begun to dig on certain of them, its alleged discoveries of extraordinarily rich ore being widely heralded. According to our advices efforts are being made to collect enough of this ore to make a shipment, when, of course, Ely Central will be trumpeted as having entered the list of shippers and as having made the quickest record of developing into a mine of any in the Ely district. This sort of thing is, of course, downright deception. This class of ore deposit in the Ely district was abandoned years and years ago. The porphyry deposits are something very different.

The immense tonnage of ore that Mr. Farish estimates and which the ring makes its bait for the suckers is figured as existing in the southern part of the Ely Central property. *There is not yet any*

knowledge that such ore actually exists there. Broadly speaking this area is covered by rhyolite, a nonmineral-bearing rock in this district. The mineral-bearing rock is the monzonite porphyry. This is not everywhere mineralized, but only in certain portions. The mineralization is, moreover, valuable only where there has been secondary enrichment of the primary ore by downward leaching from the surface. The primary ore is of so low grade as to be worthless.

Going eastward from the steam-shovel pit of the Eureka group the monzonite is known to pass under the rhyolite, but (1) it is unknown to what extent monzonite exists under the great area of rhyolite, intervening between that and the next eastward exposure of monzonite, and covering the Ely Central property. (Some of the drill holes through this rhyolite have gone into the Arcturus limestone). Assuming that monzonite exists under the rhyolite in Ely Central (2) it is not known that it has any primary mineralization. And assuming that it does so exist and has primary mineralization (3) it is not known that there has been any secondary enrichment which is required to make pay ore. Secondary enrichment, if any, would have had to take place before the overflow of rhyolite and this is an improbable occurrence. The best geological and engineering opinion has been for years adverse to the Ely Central property and is so today.

To the east of Ely Central the nearest drill hole that has shown ore is upward of 1500 ft. distant. The great bulk of the Ruth orebody lies much further east. To the west the edge of the Eureka steam-shovel pit is 600 ft. distant and practically the whole of the first Eureka orebody lies westward of that line, while the second orebody is still further west. On the eastern side of the steam-shovel pit there is some primary ore passing under the rhyolite and beneath that is some secondary ore also passing under. The enriching solution evidently soaked outward under the rhyolite to some extent as it might into a sponge, but not far inasmuch as the secondary mineralization gradually fades out. The Nevada Consolidated has lately put down two drill holes about 200 ft. apart and each about 200 ft. east of the steam-shovel pit, consequently about 400 ft from the Ely Central line. Both of these showed the primary ore, proving the existence of the latter under the rhyolite at least so far. From one of these holes the highest assay was 0.9 per cent. copper. From the other, 0.5 per cent. This is nothing like pay ore. Consequently, we have along a line east and west through the Ely Central property a distance of about 3700 ft. between points of prospecting that have shown any mineralization and about 3900 ft. between points where pay ore is known to exist.

The ring that is rigging the stock market probably have not known all the data that we have given here, but they have known that the existence of ore has never been shown along the 1800 ft. across the southern part of their property and in representing that it does so exist or is likely to exist they are practising deception. We do not pretend to say that some ore may not exist in that rhyolite area. The best geologist cannot actually look into the ground. That rhyolite or the rock under it *may* contain diamonds, or even radium, but we do not think they do, and we agree with the geologists that the chances for finding any pay copper ore are slim. The fact that the unsuspected Chrysolite orebody at Leadville, 30 years ago, was found only 10 ft. below where "Chicken Bill' salted a barren shaft did not alter the fact that "Chicken" was a swindler.

We have told these facts about the scheme to market the Ely Central stock at greatly inflated value out of no malice or self interest, but simply in defense of honest mining, a great industry which we represent. Every attempt to sell mining stock to the public under conditions that do not afford a fair speculative chance is a blow to the industry, and we want to see the industry freed from such schemes as bring discredit upon it.

Breaker Fires in the Anthracite Country

SPECIAL CORRESPONDENCE

The large breakers in the anthracite region, from the nature of their construction are specially liable to destruction or damage by fire; and such fires frequently occur, notwithstanding constant watchfulness. In a few of the more recent constructions of this class concrete has been used, to avoid the fire risk.

The Sterrick Creek breaker at Jessup, a few miles from Scranton, was burned on Oct. 26, involving an estimated loss of $125,000. The colliery is one of the largest in the anthracite regions and the largest in the Lackawanna valley. The destruction of the breaker will throw 1206 men out of work and will prevent for an indefinite period the production of coal from the colliery. The mine belongs to the Temple Iron Company. The fire started shortly after midnight on Tuesday morning; the watchman in the course of his rounds discovered flames issuing from the upper part of the structure and turned in an alarm, but by the time that the fire companies with their primitive appliances had arrived on the scene the breaker and its valuable machinery were doomed. It is probable that if they had arrived earlier than they did nothing could have been done to save the building, owing to the dryness of the timber and the coal-dust by which it was saturated.

There were 300 men and boys working in the mine at the time the building was on fire, but all made their way out of the mine in safety through an opening in the mountain side. Later on some of these men reëntered the mine and saved over 100 mules.

While the origin of the fire is not specifically known, the officials of the company say that a gang of men were at work the previous evening repairing the breaker, and it is assumed that one of these men allowed a lighted mine lamp to stand near the sidewalls of the breaker, and when leaving forgot to quench it. There are a number of offices and dwelling houses near the breaker and six of these were destroyed. The breaker will be rebuilt as soon as practicable, but it will necessitate a postponement of mining operations at the colliery either until the breaker is rebuilt or some arrangement is made to transfer the coal to some other breaker.

A fire which occurred on Oct. 25 came within measurable distance of destroying the breaker of Jermyn colliery No. 1 at Old Forge. The engine-house of the colliery took fire and threatened the breaker which is in its immediate vicinity. Energetic work on the part of employees, with the assistance of the local firemen, saved the breaker, there being comparatively little wind. Although some men and boys will be temporarily thrown out of employment, since the breaker was saved, the operations at this mine will be resumed in a short time. The Jermyn breaker was burned down a few years ago almost under identical circumstances.

The Federal Mining and Smelting Company

The report of the Federal Mining and Smelting Company, operating mines in the Cœur d'Alene district, Idaho, for the year ended Aug. 31, 1909, states that the gross tonnage of ore mined was 832,568, yielding 122,764 tons (net) of concentrates and shipping ore which contained 3,111,931 oz. of silver and 56,904 tons of lead. The net earnings were $1,185,946, from which

FEDERAL BALANCE SHEET.

ASSETS:	
Property	$18,895,125.36
Material and supplies	128,132.64
Accounts receivable	265,937.71
Cash	921,106.31
	$20,210,302.02
LIABILITIES:	
Capital stock outstanding	$18,000,000.00
Payroll, taxes and current accounts payable	239,129.63
Dividends payable on September 15, 1909	209,756.75
Surplus	1,761,415.64
	$20,210,302.02

$285,656 was deducted for depreciation and development account, leaving $900,290. Dividends amounting to $839,027 on the preferred stock and $89,894 on the common, a total of $928,921, were declared, thus reducing the surplus to $1,761,415, as compared to $1,790,046 of a year ago. The balance sheet as of Aug. 31, 1909, is shown in an accompanying table.

Batopilas Mining Company

A circular just issued by Lyndon H. Stevens, president of the Batopilas Mining Company, gives the details of the plans for interesting British capital in the property. It says:

"The board of directors has approved a contract between this company and the Batopilas Mining, Smelting and Refining Company, Ltd., of London. The latter company is an English corporation organized under the companies' act of 1908. It has an authorized capital of £300,000 divided into 300,000 shares of £1 each. Under the contract, the Batopilas Mining Company receives and will hold permanently in its treasury 250,000 of the 300,000 shares of the English company. Of the remaining 750,000 shares, 50,000 shares will be issued for cash at the rate of not less than $7.50 per share, and the balance of 25,000 shares will for the present be retained in the treasury of the English company. It is provided that the English company shall lease the present plants, including the mills and haciendas and the following groups of mines: Todos Santos, Cinco de Mayo, Ballinas and San Miguel, the working of which will continue as at present, with operations increased by the acquisition of a large amount of additional working capital.

"The contract provides that the English company shall pay, principal and interest, the entire bonded indebtedness of the Batopilas Mining Company. The lease will be for a period of 25 years with privilege of renewal on the same terms. Under the proposed arrangements the physical operation of the properties will remain under the control of the board of directors of the Batopilas Mining Company and operations will be conducted by the same officers and agents who are now conducting them. The more extensive operation of the mines covered by the lease will assure to the shareholders of the Batopilas Mining Company an increased return from these mines. The directors plan to make similar arrangements with other operating companies for working the other mines of the company and also for starting new mines at favorable points throughout the territory covered by the concession."

It is further announced that Gilmore Goodland, an English mining engineer, has reported favorably on the properties and recommended improvements in the 100-stamp mill and the introduction of the cyanide process.

The Batopilas company owns 1600 acres in western Chihuahua, Mexico, including the Batopilas mine developed by Alexander R. Shepherd and also a concession to 61 sq.m. of territory in Chihuahua. Plans are now being matured for the increased working of the mines now being operated, and also for the formation of subsidiary companies to fully develop the unworked mines within the mineral concession.

October Dividends

In the accompanying table are shown the amount per share and total amount of the dividends paid during October, 1909, by a number of mining and industrial companies in the United States, Canada and South and Central America.

U. S. Mining Companies.	Location.	Amt. per Share.	Amt. Paid.
Alaska Mex., g.	Alaska	$0.60	108,000
Alaska Treadwell, g.	Alaska	1.00	200,000
Alaska United, g.	Alaska	0.40	72,080
Anaconda, c.	Mont.	0.50	600,000
Beloit-Etmo, l.	Wis.	....	4,000
Boston & Montana, c.	Mont.	3.00	450,000
Bunker Hill & Sull., s.l.	Ida.	0.50	45,000
Camp Bird, g.	Colo.	0.24	198,850
Colorado, l. g. s.	Utah	0.08	80,000
Copper Range, c.	Mich.	1.00	384,185
Gold Dollar Con., g.	Colo.	0.01½	12,500
Goldfield Con., g.	Nev.	0.30	1,067,510
Daly West, g. s. l.	Utah	0.30	54,000
Elkton Con., g.	Colo.	0.01½	37,500
Florence, g.	Utah	0.10	105,000
New India Quicksilver, q.	Cal.	0.30	30,000
Homestake, g.	S. Dak.	0.50	109,200
Silver King Co't'n, s. l.	Utah	0.15	187,500
Sioux Con., s. l. g.	Utah	0.07	52,780
Tonopah of Nev., s. g.	Nev.	0.35	350,000
U. S. Smelting & Ref., com.	U. S.	0.50	175,505
U. S. Smelting & Ref., pf.	U. S.	0.87½	425,250
Uncle Sam, g. s. l.	Utah	0.02	10,000
Utah Con., c.	Utah	0.50	150,000

U. S. Industrial Companies.	Location.	Amt. per Share.	Amt. Paid.
Am. Agr. Chem., pf.	U. S.	$3.00	544,590
American Coal Prod.	U. S.	1.37½	143,253
Am. Sm. & Ref., pf.	U. S.	1.75	875,000
Am. Sm. & Ref., com.	U. S.	1.00	500,000
Col. & Hock. C. and I., pf.	Ohio	1.50	103,866
General Chemical, pf.	U. S.	1.50	150,000
Lehigh Coal & Nav.	Penn.	2.50	960,450
Republic I. & S., pf.	Ill.	1.75	357,295
Va. Carolina Chem., pf.	U. S.	2.00	360,000

Foreign Mining Companies.	Location.	Amt. per Share.	Amt. Paid.
Buffalo, s.	Ont.	$0.05	45,000
Crown Reserve, s.	Ont.	0.15	262,500
La Rose, s.	Ont.	0.20	228,673
Lucky Tiger-Com., g.	Mex.	0.60	39,000
New York & Hon.	Hond.	0.10	15,000
Nipissing, s.	Ont.	0.37½	450,000
Pinguico, s.	Mex.	3.00	60,000
Rio Tinto, pfd., c.	Spain	0.60	195,000
Rio Tinto, prd., c.	Spain	7.20	2,700,000

Smelting in Bond

SPECIAL CORRESPONDENCE

Work has now been begun in the customs division of the Treasury for the purpose of carrying into final effect the provisions of section 24 of the tariff act of Aug. 5, 1909, relative to smelting in bond. Investigators have been sent into the field to study the amount of wastage actually incurred at the smelters, and it is stated that the new regulations may be issued in their final form within a month, or very shortly thereafter. In the meantime producers are not being deprived of the advantages of the act, but have been allowed to proceed with their operations subject to tentative regulations. The text of these latter has not been made public, and, so far as possible, their main terms have been kept private; but they are understood to be satisfactory to the producers. The investigations now in hand relate solely to lead, and the new regulations will deal exclusively with the smelting of that metal. This is in pursuance of the interpretation already adopted by the Treasury Department that the act of Aug. 5 in its provision for smelting in bond had reference to lead and to that metal alone.

Chronology of Mining for October, 1909

Oct. 1—Batopilas Mining Company announces plans to interest British capital in Chihuahua property owned by the company. Copper converting plant started at the Torreon smeltery in Coahuila.

Oct. 3—Fifteen men killed in explosion in Northwestern Improvement Company's coal mine at Roslyn, Washington.

Oct. 5—Explosion in Extension coal mine at Nanaimo, B. C., resulted in loss of 30 men.

Oct. 6—Doyle-Burns suit involving an interest in the Portland mine, Cripple Creek, Colo., settled out of court.

Oct. 8.—Announcement of the purchase of the Burro Mountain mine in New Mexico by Phelps, Dodge & Co., Inc.

Oct. 15—Smeltery of the Arizona United Mines Company at Johnson, Ariz., blown in.

Oct. 15—The directors of the Nevada Consolidated Copper Company propose a consolidation with the Cumberland-Ely company on the basis of 3¼ shares of the latter for one of the former company.

Oct. 19—Receiver appointed for the Frances-Mohawk Mining and Leasing Company, of Goldfield, Nevada.

Oct. 20—The supreme court of Massachusetts denied the petition for a rehearing in the suit of the Old Dominion Company of Globe, Ariz., against A. S. Bigelow, in which $2,000,000 was awarded the company.

Oct. 21—Explosion in the Rock Island Coal mine at Hartshorne, Okla., several men being killed.

Oct. 29—Explosion in Rhymney Iron Company's colliery at Glamorganshire Wales, killing 20 men.

Oct. 30—Twelve men killed in explosion in Cambria Steel Company's coal mine near Johnstown, Pennsylvania.

According to the *Journ.* of the Chamber of Mines of Western Australia, Aug. 31, 1909, the dividends paid by 17 of the principal mines amounted to £903,235 for the first eight months of 1909. During this period the Golden Horseshoe paid £165,000; Great Boulder Proprietary, £131,250; Ivanhoe, £190,000; Kalgurlie, £112,500, and the Great Boulder Perseverance, £70,000. The total to date for these 17 mines is £16,577,148.

Details of Practical Mining

Notes of Interest to the Operators of Small Mines as Well as of Large Mines. The Things That Have to Be Done in Everyday Mining

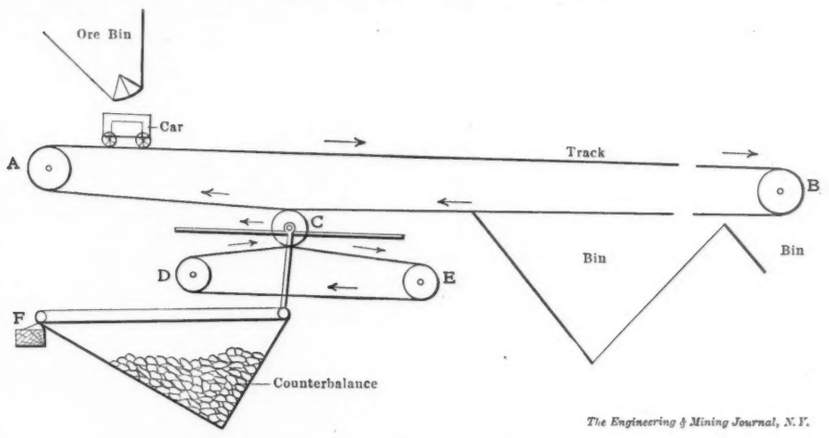
REPORTS FROM EXPERIENCE

Readers of the JOURNAL are invited to contribute to this department. Articles should be brief, thoroughly practical, and preferably illustrated by drawings or sketches. Our draftsmen will prepare properly any kind of a pencil sketch that is intelligible. Something that is an old story in one district may be quite unknown in another. Articles accepted and published are suitably paid for.

Device for Distributing Ore in Bins

BY FRED W. MONOHAN*

The following simple contrivance should be of interest to all mining men who have ore to bed or to distribute in bins for shipment. It consists of an inclined track running over the ore bins, and a car with a side discharge attached to an endless ½-in. wire rope. This cable passes over stationary sheaves *a*, *b*, *d* and *e*, and a double sheave *c*, the extended axle of which runs on a track or frame. As the loaded car goes down its track, the sheave



GRAVITY DUMPING SYSTEM

c also moves along its track and raises the counterbalance to which it is attached.

The counterbalance consists of a triangular wooden box filled with rocks or scrap iron and hinged at *f*. When the loaded car has reached its dumping place it engages a tripper which opens the latch on the car and allows the load to drop out. As soon as the weight is relieved the counterbalance pulls the car back to the starting place for the next load.

The place of dumping can be changed by the man in charge by moving the tripper which is fastened to an endless wire and can be changed at will from the loading station. The car does not have to run to the end of the track each time, as in most gravity systems, but returns as soon as unloaded and stops in its proper position.

The mechanism having few wearing parts is always in repair and can be easily adjusted to the highest speed by changing the amount of ballast in the counterbalance box, which also takes up very little hight. By this means one man can handle as much ore as four by the ordinary hammering system.

*1155 East Sixth street, Salt Lake City, Utah.

Driving Vertical Raises with Stoping Drills

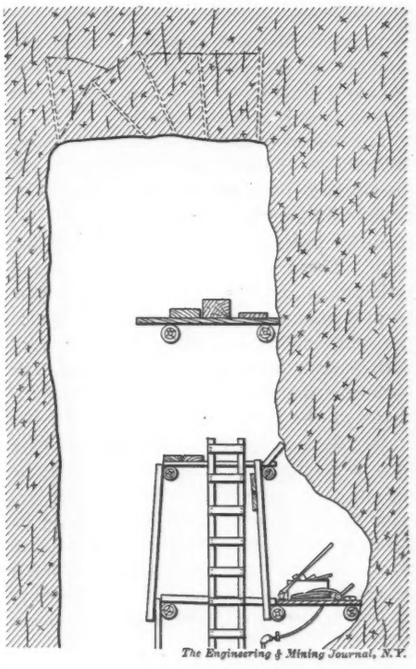
BY ARTHUR O. CHRISTENSEN*

In driving a vertical raise, especially on a narrow vein, I find that greater speed can be made in the long run, greater safety maintained, more vein material broken in proportion to waste, and the raise can be run up indefinitely with but little increased labor as the raise progresses if the system described herein is used.

Such a raise is made quite narrow, i.e., 3 or not over 4 ft. wide, but 6 or 8 ft. long. This shape allows of easily putting in a round with the "buzzer" machine. The smallest-sized machine should be used.

Stulls are placed in pairs 4 or 5 ft. apart, one being put across the middle, and the other across the end of the raise. The stulls placed in the middle must be directly over one another, or at least in line, for they are to form the partition between the manway and chute. It is well to let the raise incline slightly toward the chute side so that the broken rock in falling down will wear against the rock at the chute end of the raise rather than against the lagging between the compartments. Except for the last two pairs of stulls the middle ones are lagged up as the raise progresses and ladder and pipe line are carried along, as shown in the accompanying illustration. The condition of the raise after the round has been put in and the holes are ready to be loaded is here shown.

At the beginning of the shift it is first necessary to clean the muck from the platform at the top, and to pick down. This done, a few planks are placed across the chute from the middle stull of the next to the top set. This keeps any tools or steel from falling into the chute. I find it well to spread a piece of canvas over these planks to make them tight. Two long planks are then laid across the top platform, extending to the chute end of the raise. These are securely spiked down at the manway end. To prevent accident from the nails pulling out it is well to bind the ends of the planks down to the



STATION AND TIMBERING IN VERTICAL RAISE

*Mining engineer, Dorchester P. O., Colo.

stull with baling wire. An opening is left between these planks on the chute end through which the miner can climb.

The machine, steel and tools are next brought up to the top from where they are kept in a pocket or station cut in the side of the manway below. Short planks, blocks and such, necessary for rigging up the machine, are kept on the top platform. They serve to strengthen it from being broken by the rock shot down onto it.

This whole operation takes about 1½ hours. A round of about 10 holes takes two or two and one-half hours, so that by dinner time the round is in and the tools and machine again put away. After dinner hitches must be cut or stulls put in. It is well to cut the hitches one day and the next day put in the stulls and move up the platform and ladder if needed. Every 30 or 40 ft. it is necessary to cut a pocket in which to keep the machine, tools, etc. To cut this pocket usually requires two rounds, which are shot at the same time as the regular round. An hour or an hour and a half is required to timber this up. The pipe line must also be run up from the former pocket. To keep the raise timbered up, make these pockets and put in the pipe line and ladderway keeps one man pretty busy. Yet it makes a desirable job for a good miner and does not require him to unduly strain himself.

The scheme of placing the round of holes depends on the ground, the shape of the breast and the sort of vein being followed. In general it is well to put in two rows of holes, one on each side of the vein. These holes should be staggered rather than in pairs. Sometimes it is best to put from 5 to 8 holes on one side of the vein, and then to bring down the vein with 3 or 4 holes placed back of it. In each case the round must be suited to the shape of the breast and character of the rock. By having the raise with its long axis with the vein a deep round can be put in. If it were possible to keep up with the timbering a 4-ft. round could be put in at each shift. When one man is doing it all, however, he must limit the depth of his round to the amount of timbering, etc., which must be done the next shift.

Not including cost of timber, tramming out of dirt, sharpening steel and compressing air, the cost of driving a raise of this character, when run by a good hustling miner, should not be over $3 per foot, and under favorable conditions, considerably less.

Doing every bit of work in connection with driving such a raise by myself I have driven 67 ft. a month, shooting each shift. During that time there was only one missed hole and no case of holes going out of turn. I attribute this success to the care taken in loading the holes and in the method used for spitting them, which method I described in the JOURNAL for April 17, 1909, page 813.

An Underground Haulage System

By ALBERT H. FAY.

The problem of handling a large tonnage of ore underground is usually a serious one, especially in the matter of cost. The system that is now being installed between the 700 and 800 levels by Witherbee, Sherman & Co., promises to be one of great importance in handling the magnetite ore in their mines at Mineville, N. Y. The installation is expensive and could be used only by mines handling a large tonnage for a number of years.

Up to the present the mining has been carried on by working on large faces of ore 50 to 75 ft. high and several hundred feet wide. The ore was shot down to the foot of this face and then shoveled by hand into the mine cars which were pushed to the shaft by hand. The ore is heavy and in most cases it requires at least 3 to 5 men to handle a single car.

The scheme now under way consists of a haulage way installed 60 ft. below the present working level. This underground passage is in the form of an ellipse, with a circumference of about 1000 ft., and opens an orebody 500 ft.

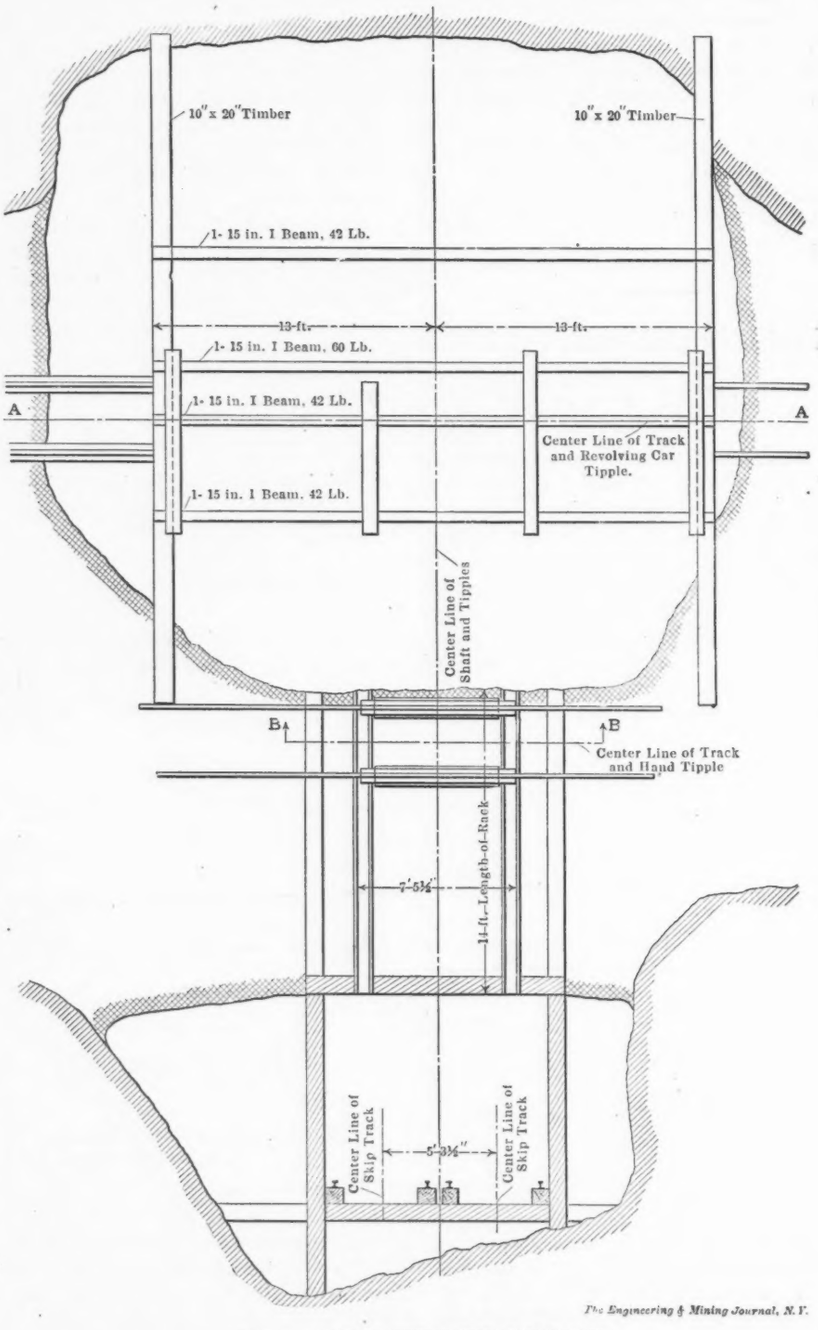

10" x 20" Timber
10" x 20" Timber
1- 15 in. I Beam, 42 Lb.
13-ft.
13-ft.
1- 15 in. I Beam, 60 Lb.
1- 15 in. I Beam, 42 Lb.
A
A
Center Line of Track and Revolving Car Tipple.
1- 15 in. I Beam, 42 Lb.
Center Line of Shaft and Tipples
B
B
Center Line of Track and Hand Tipple
14-ft. Length-of-Rack
7'-5½"
Center Line of Skip Track
5'-3½"
Center Line of Skip Track
The Engineering & Mining Journal, N.Y.

FIG. I. PLAN OF TIPPLE, BIN AND SHAFT

wide, 60 ft. deep, with an indefinite length. At least 1,000,000 tons of ore are now blocked out to be handled by this installation. Along this drift are at least a half-dozen raises, inclined at about 45 deg., which will be used as mill holes. The mining will be carried on by stoping down, setting the machine drills near the raises and shooting the ore down to the loading platforms. The large number of raises will give ample space for a number of machines and as the work progresses it will give still more room.

Concrete Platform.

As the ore passes down through the raise, it falls upon a loading platform built of concrete. This platform is 4½ ft. high, 10 or 12 ft. long, 8 or 10 ft. wide according to the condition of the ground, with a loading chute 3 ft. above the top of rail, as shown in Fig. 1. It is built with a slope from the back to the front as well as a slope from each end to the center. The chute will be covered with sheet iron.

Storage Bin.

At the shaft an 800-ton storage bin has been built, the bottom of which is 46.5 ft. below the top of the car tracks. Figs. 2 and 3 show the construction of the bin, together with the arrangement of tipple and the skip loading chute. The tipple at the right of the drawing is 26 ft. long and will dump 3 cars at once. It is operated by an electric motor and revolves upon trunnions. The bin gate and the loading chute are operated by air hoists as shown. The auxiliary tipple at the left will dump only one car at a time and is to be used only when tramming by hand in case the electric motor haulage system is out of commission. This is also to be used as a waste pocket when it is necessary to dispose of waste from the same loading station. Between the shaft and the bin is a rock pentice which serves as a support for the auxiliary tipple and at the same time forms the front wall of the ore pocket.

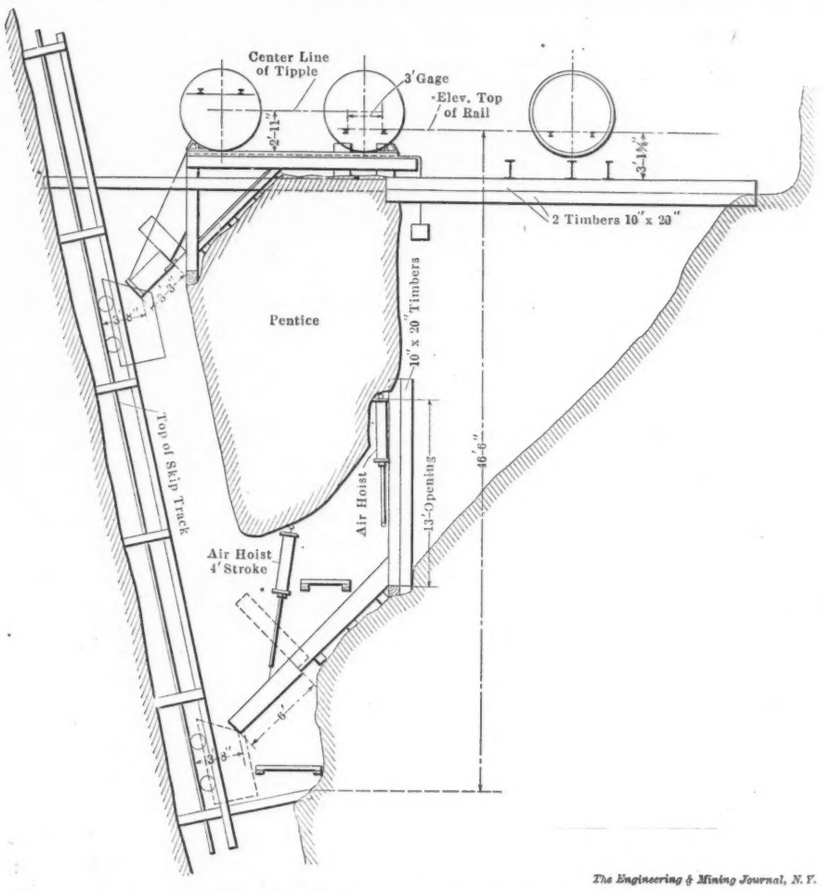


FIG. 2. SECTIONAL VIEW OF TIPPLE AND BIN

Operation.

The cars are of 3 tons capacity and will be handled in trains of 9 cars each. The motor truck has two 25-h.p. motors operated on 220-volt direct current. The haulage track is 45-lb. rails. While lighter rails could be used practice has demonstrated that the heavy rails are better as they are not easily broken by heavy pieces of ore falling upon them. They are also more solid, require less ties and give a better track. The motor in passing around the track gathers up the loaded cars and pushes them in front. When the tipple is reached, three cars are dumped. These are then pushed through the tipple and three more dumped until all are empty. The motor then goes around the tipple on a side track and couples the nine empty cars on behind. When the first loading station is reached, the loaded cars are picked up, and one, two or three empty cars left in their place as may be desired. In this way the motor will be in operation all the time and with an 800-ton storage bin it is possible to keep the hoist working up to its full capacity with no loss of time as was the case when the cars were operated by hand power. When this equipment is completed, it is expected to be able to handle 1000 tons per 10-hour shift. The ore is hoisted in self-dumping skips. I am indebted to S. LeFevre, chief engineer, Witherbee, Sherman & Co., for the above information.

Timber Shafts in the Hibbing District

In the majority of the mines in the Hibbing district, Mesabi range, all of the timber used for the mines is lowered through a separate shaft constructed for this purpose. This shaft also serves as an air passage. The shaft is lined with plank, placed vertically, so there is no chance for the timber to catch on the walls. This shaft is placed as near as possible to the underground work so that the material may be readily distributed.

The timber is lowered by a windlass which is controlled by a brake of the prony type. A four-post headframe is used. The drum used for winding is 1 ft. in diameter, while the portion upon which the brake is operated is 18 to 24 in. in diameter. Several pieces of timber are bundled together with a chain, and as the load nears the bottom a timber truck is run under and the bundle deposited upon it, thus avoiding rehandling. In this way no delay is caused in the ore-hoisting shaft.

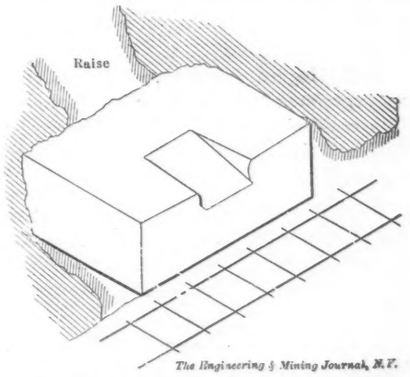


FIG. 3. CONCRETE LOADING PLATFORM

The Broken Hill Proprietary Company reports continued satisfactory results from the turbo blowers at its Port Pirie smeltery.

Personal

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

F. F. Sharpless has returned to New York.

J. Parke Channing returned to New York this week.

Dr. Ludwig Mond, of the Mond Nickel Company, Sudbury, Ont., was in Toronto recently.

Frederick H. Minard has returned to New York from an extended visit to Central America.

Thomas Willis, of Norway, Mich., has been appointed mining captain of the Berresford mine at Spring Valley.

Richard K. Park, of Philadelphia, president of the Tonopah-Belmont Development Company, has gone to Nevada.

Charles Davenport has been appointed engineer of the mines of the Colonial Mines Company in Sierra Juarez district, Oaxaca, Mexico.

Quincy A. Shaw, of Boston, vice-president of the Calumet & Hecla Company is in the Lake Superior country on one of his periodical visits to the mines.

E. J. Sweetland has been in Guanajuato, Mexico, in the interest of the Sweetland Filter Press Company. He expects to visit El Oro, Pachuca, and other districts.

Alexander Agassiz, president of the Calumet & Hecla Mining Company, accompanied by his son Adolph, one of the vice-presidents, is at the mine on a semi-annual visit.

R. B. Hegardt has resigned his position as superintendent of the Old Dominion Copper Mining and Smelting Company at Globe, Ariz. He is at present in California.

Fred T. Williams has returned to Park City, Utah, after a professional trip to the mines of the Mount Wilson Gold and Silver Mining Company near Newmire, Colorado.

S. E. Bretherton, San Francisco, Cal., has just returned from Lodi, Nev., where he started and operated successfully before leaving, the Lodi Mines Company lead smelter.

S. H. Brockunier has returned to Wheeling, W. Va., after examining a large tract of land in Lincoln and Wayne counties in that State for coal, oil and gas development.

Dr. William P. Blake, Territorial geologist, has been actively at work in several parts of Arizona. He recently returned to Tucson after inspecting the Sallie mine in Santa Cruz county.

Dwight E. Woodbridge, of Duluth, Minn., recently completed an examination of the Orijarvi iron mine in Finland, which is owned by the Finnish-American Mining Company, of Calumet, Michigan.

F. A. Ross, late manager of the Daly Reduction Company, Ltd., Hedley, B. C., has gone to Hostotipaquillo, Jalisco, Mexico, in the interests of the estate of Marcus Daly, which has the Cinco Minas group under option.

John Riggins has been appointed superintendent of the Ocean mine of the Consolidation Coal Company, near Clarksburg, W. Va. He succeeds K. D. Bailey, who is transferred to the Gypsy mine of the company.

Chief of the Department of Mines of West Virginia, John Laing, Oct. 30 announced the resignation of A. J. King, his chief assistant. Mr. King will assume the management of the Mann mines on the Norfolk & Western railroad.

Percy A. Babb, assisted by Henry Valle y Cambre, has completed an investigation of several mines in the Magistral camp near Ameca, Mexico. D. De Long, of Guadalajara, Mexico, is on a visit to Boston in connection with professional matters.

J. Stevenson Brown, who for 10 years acted as treasurer of the Canadian Mining Institute and recently retired from the position, was on Oct. 22 presented at Montreal by a number of the members with a handsome silver service as a mark of their appreciation of his work.

Charles M. Schwab, president of the Bethlehem Steel Company, during the past week paid a visit to George G. Crawford, president of the Tennessee Coal, Iron and Railroad Company, a subsidiary company of the United States Steel Corporation. The visit was of short duration, but during the time Mr. Schwab inspected the steel plant of the Tennessee company, at Ensley, Ala., and also went over the prospective developments by the Steel Corporation in the Birmingham district. No statement was made as to the objects of the visit, but the general understanding is that advice was given or recommendations made by the prominent steel man.

Obituary

John Crabell, analytical chemist at the plant of the Utah Copper Company at Bingham, Utah, was accidentally killed, Oct. 18, becoming entangled in a shaft in the mill. He was a young man, and went to Utah from Virginia.

Edmund Hendricks died at his residence in New York, Oct. 27. He was senior member of the firm of Hendricks Brothers, owners of the oldest copper-rolling mill in America, and had been in the metal trade in New York for the whole of his active life. He was much respected for his business ability and integrity, and for his broad views.

James W. Brown, president of the Colonial Steel Company, Pittsburg, and a prominent member of the iron and steel fraternity of the Pittsburg district, died, Oct. 23, at Pont Mouille, Mich. Mr. Brown was born in Pittsburg 65 years ago and was the son of William R. Brown, a pioneer iron and steel manufacturer of that city. After completing his education in Pittsburg he entered the iron business with his father. Four years later, in 1866, he became associated with the Wayne Iron Works, of Pittsburg; he accepted in 1876 the position of assistant mill manager of Hussey, Wells & Co. He filled various responsible positions with that firm and was finally admitted to partnership, the firm becoming Hussey, Brown & Co., and later Howe, Brown & Co. When the Crucible Steel Company of America was formed, the interests of Howe, Brown & Co. were absorbed and Mr. Brown became one of the vice-presidents. He retired from the company eight years ago and formed the Colonial Steel Company, establishing a plant at the new town of Colona opposite Monaca on the Monongahela river. He continued as president of this company until his death.

Societies and Technical Schools

Illinois State Mining Investigation Commission—The recently appointed members met at Springfield, Oct. 18, and effected organization by electing Richard Newsam chairman and John H. Walker secretary. After a discussion of the proposed scope of the work to be done by the commission, it adjourned to meet, Oct. 25, in Chicago.

Western Kentucky Coal Operators' Association—This association has elected the following officers for the ensuing year: George C. Atkinson, secretary of the St. Bernard Coal Company, president; Capt. I. P. Bernard, of Louisville, president of the Williams Coal Company and the Taylor Coal Company, vice-president, and D. Stewart Miller, of Owensboro, secretary and treasurer.

Coal Mining Institute of America—Dec. 16 and 17 are the dates decided upon for the winter meeting. S. A. Taylor, president of the Crescent Coal Company, and W. E. Fohl, Pittsburg, are a local committee to arrange for the meeting. Inspector T. K. Adams, chairman of the committee on constitution and by-laws, has called a meeting for Nov. 29 at 915 Lewis block, Pittsburg.

New River Operators' Mutual Association—This association has been formed by coal operators along the line of the Chesapeake & Ohio in West Virginia. The officers will be: J. Fred Effinger, Staunton, Va., president; William McKell, vice-president, and W. J. R. Zimmerman, secretary and treasurer. A large executive committee, embracing most of the important interests in the field, will be appointed.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at Butte, Denver, Salt Lake City, Goldfield, Cobalt and Toronto

REVIEWS OF IMPORTANT EVENTS

San Francisco

Oct. 28—The San Francisco Sulphur Company is examining the old Supan sulphur deposit 55 miles from Red Bluff, Tehama county, on the west slope of Mt. Lassen, about five miles from Morgan's springs. This deposit of sulphur was located over 30 years ago by Dr. Milton Supan and a road was built to it, but there was no output. The Deer creek survey for the Goose Lake Southern railroad passes within eight miles of the deposit. The quality of the sulphur is good but the expense of getting it to market has heretofore prevented the mine from being worked.

Oroville, Butte county, has become a competitor with Marysville, Yuba county, for the proposed connecting road with Downieville, Sierra county. This latter county is isolated with no railroads and few good wagon roads, and its mining industry is becoming of increasing importance. The Yuba county supervisors proposed to join with Sierra in bringing a new road to Marysville to connect with rail, but nothing has been done as yet. Meantime the Chamber of Commerce of Oroville has come to the front and proposes that if Sierra county will build to its county line, Butte county will be willing to pay for the few miles of road that would connect with the Oroville-La Porte road. The proposed route to Oroville will be 14 miles shorter than that to Marysville and with lighter grades.

A strike has been made in the Twenty-One mine at Alleghany, Sierra county, which bids fair to rival that in the famous Sixteen-to-One mine at the same place. Some of the ore from the new shoot is as rich and handsome as any that has yet been found in the district. The Twenty-One is owned by H. H. Noble, of San Francisco. The vein is supposed to be an extension of the Tightner. The mine has the deepest workings of any mine on Alleghany ridge; the tunnel in the Twenty-one is 250 ft. lower than that on the Tightner and 500 ft. lower than the Sixteen-to-One. The vein is about 5 ft. wide and carries specimen ore where found. The rich portion is about 1½ ft. wide. Some of the ore runs up into the thousands per ton.

The Rainbow Extension, in this same district, owned by Mrs. James Clinton, is under bond to San Jose men, with O. A. Harlan as manager. This mine, too, has developed an exceedingly rich shoot. There is from 1 ft. to 18 in. of very rich rock, 147 ft. from the mouth of the tunnel. The mine belongs to the Tightner system of veins and is between the Rainbow and Twenty-One on the south side of Kanaka creek. The vein found is a blind one and was not seen on the surface. Beautiful specimens are being taken out, much like those from the other rich mines of the district.

The tunnel of the Trinity River Mining Company at Lewiston, Trinity county, has been completed and part of the river has been turned through in order to sluice out a certain channel. The full stream to be carried by the tunnel is 25,000 in. of water. The tunnel is 8x10 ft. in the clear and 1350 ft. long. Its cost was $125,000. Over a mile of the bed of the river will be laid bare for mining purposes when the waters of the river are diverted through the new tunnel.

The Middle Yuba Electric company will not get its lines to Alleghany, Sierra county, before the winter sets in.

The Manley Lumber Company at Greenview, Siskiyou county, has secured options on lands on the Klamath river near Oak Bar and intends to "drift" it, the gravel being only 30 ft. to bedrock. Prospecting operations, however, show a great deal of water and the idea of putting in a dredge is now being considered.

The Horse Mountain copper deposits, of Humboldt county, are just now attracting some attention. The claims are in a high mountain section reached best at present by trail from the main road at Berry's. The ore of the district is considered to average about 6 per cent. copper. Several claims are being developed and there is considerable ore in sight, but thus far there has been no production as there are no reduction works locally situated, and it costs considerable to ship to Korbel, though some of the properties are making small shipments in that direction, ultimately intended to reach the smelters at Tacoma. It will cost about $20 per ton to get the ore to Tacoma.

Butte

Oct. 28—The production of the Amlagamated properties continues to be normal, but the cost of production is low. It is estimated that the Anaconda, and Butte & Boston companies are producing for 10c. and the Boston & Montana Company for 9c. a pound. The Parrot company is just about breaking even. It is thought that under the leadership of John D. Ryan, the policy of secrecy, so long cherished by the company, will be discarded and the company stockholders will be given more information regarding the inner workings. It is also thought that Mr. Ryan will pursue a more active policy than has formerly been pursued, and that the company will increase its holdings and property in other parts of the country. Persistent rumors of a copper combination headed by J. P. Morgan are received from the East. The rumor has it that the Amalgamated, Guggenheim and Phelps-Dodge interests will enter into the deal.

President Amster of the Boston & Corbin Copper Company has made his annual report to stockholders for the year ended July 31. From the report it appears that 4000 ft. of development work has been done during the year. The mine is connected with the main power line of the Missouri River Power Company, and as soon as the power is turned on, the surface plant will be operated by electricity. The principal development work has been done on the 500-ft. level opening up the Bertha and Fair View veins. On this level the drift has been run on the vein about 1600 ft., and is still in ore. The report states that the company has $185,000 in its treasury, with $8000 liabilities, exclusive of its capital stock. It is the president's opinion that when the 700-ft. level is opened up, which should be within three months, the mine will supply the concentrator with 300 tons of ore daily.

Rumors of threatened litigation between North Butte and Tuolumne companies over the ownership of a portion of the Tuolumne claim continue to grow, and the stock of the latter company has reflected the depressing effect of this gossip. It has recently come to light that John G. Morony, president of the Daly Bank and Trust Company, of this city, and one of the leading Amalgamated officials in the camp, purchased a fractional interest of the Tuolumne claim over a month ago from Patrick Meagher and Rachael Meagher. This fraction has been deeded to the North Butte company by Morony. While the ground purchased is relatively small, yet it makes possible some interesting complications.

The Tuolumne management states that it is not at all concerned over the purchase since the president, Mr. Hickey, secured a deed for the same fraction from the same people several years ago, but never had the deed recorded. While the position of the Tuolumne company would appear to be secure at the first glance, yet the law of Montana is to the effect that though an unrecorded deed

is good as between the parties to the deed, such deed is void as against any subsequent purchaser in good faith and for valuable consideration whose deed is first duly recorded. In other words, the Morony deed would take precedence over the Hickey deed unless it could be shown that Morony had knowledge of the previous deed to Hickey.

Denver

Oct. 29—In the Doctor-Jack Pot suit against the Work Mining and Milling Company to recover $2,000,000 worth of ore alleged to have been extracted without right, from the Little Clara mine, the following question was put to Judge Lewis, in the United States circuit court, in a demurrer filed by the latter company: If the owner of a mining claim fails to discover an apex vein on his property, which the owner of the adjoining claim does discover, is he barred from exercising extra-lateral rights to the vein, and has the owner of the adjoining claim the right to extract ore from it? This question may sound like a word puzzle, but on the deciding of it hinges $2,000,000, and the settlement of a point of mining law that will have far-reaching effect.

Sir Henry Seton-Karr and Ernest Foster, as trustees of the Caledonia Gold Mining Company, Ltd., have commenced suit in the United States circuit court to recover $15,000 damages and also possession of the Caledonia mine from Frank Boach, of Los Angeles, who paid taxes on it for six years, and obtained the property under tax title, and then leased it to local parties. The mine was formerly owned by W. S. Stratton, and leased to the late J. Maurice Finn, who cleaned up about $50,000 from it in 1894-5. It has not produced pay ore since. The mine is on a low spur of Gold hill, near Mound City, below Cripple Creek town.

In the San Juan region, Charles A. Kuenzel has agreed to erect a 100-ton smeltery at Ouray, and to keep the same in operation for at least five years upon being first guaranteed 100 tons of ore per day for that period, the smelting charges not to exceed $4 per ton.

Three new mills at Silverton are nearing completion, the Vermillion, Peerless, San Juan and Intersection. The washout of the Rio Grande railroad, which cut off Silverton from its ore market and base of supplies 46 days in July and August, was put in shape by Otto Mears in 17 days. On Sept. 5 a washout occurred at Telluride, which treated that camp in a similar manner. Otto Mears was called in two weeks ago and he has just raised that blockade also, and business has been restored to its usual active state in both camps. Notwithstanding the drawback from washouts, and the railway being put out of commission, the carload shipments for nine months from Silverton are given at 23,535 tons of concentrates, and 4830 tons of crude ore.

A gold stampede is reported to Woodland park, on the Colorado Midland railroad, not far from Colorado Springs, and another north of Newcastle, in Garfield county, engineered by Denver and Cripple Creek people. Here, however, it is stated that a tunnel has been driven 100 ft. on the course of a vein of auriferous pyrite, which will average $30 per ton in gold.

Cobalt

Oct. 30—Work is being rushed on the installation of the new water and sewage system for Cobalt, and stream drills are being worked night and day cutting trenches from lake Sasaganiga, along Prospect avenue. It is impossible, however, to put in this system this fall, as the frost has already made itself felt, and in some few cases the water pipes of the present system, which are merely laid along the surface, have been frozen. The work on the foundations for the new steel tank in connection with the system has been temporarily suspended, owing to a misunderstanding between the town and some of the mines. The question of a pure-water supply is of vital importance, as the fever epidemic amply testifies.

Development in South Lorrain is being steadily carried on, and the results so far have amply justified the faith in the camp felt by the operating companies. At the Wetlauffer the shaft is down 100 ft., and at that depth not only do the veins hold good, but have every appearance of increasing in richness. This mine will be ready soon to make a second shipment of high-grade ore, and steady shipments may be looked for. The Newman property reported a second rich discovery.

Improvement in the train service to Cobalt has been brought about recently. For some time the Mine Managers' association made representations to the railway officials for better service, and the recent addition of a dining car to the daily train from Toronto is much appreciated. In spite of every effort made by the railway to handle the large quantities of freight at this point as expeditiously as possible, the congestion nevertheless continues, and the mines are still experiencing considerable difficulty in the matter of a sufficient fuel supply, many of them being obliged to run very close to a shut down. It would seem that the only solution to the problem is the speedy arrival of the various power lines in camp. Only two mines, the King Edward and Colonial, are as yet using this power, but it is confidently stated by the power companies that they will have their power ready for distribution by the first of the new year.

In connection with the typhoid epidemic it is worthy of note that the railway companies are granting free return passes to the nurses brought in by the hospitals, to the points from which they originally came. This step is highly appreciated here, as the unusual tax on the resources of the Red Cross hospital, as well as the town hospital, will be greatly relieved thereby. For the past few days the number of cases reported has greatly decreased, and from now on a steady falling off is looked for. However, the health officers are not relaxing their vigilance in any respect, as can be seen by the fines imposed for unsanitary conditions.

Mexico

Oct. 30—The bill before the chamber of deputies providing for a rebate of duties on raw materials that are to be put into finished products and reshipped out of the Republic is causing considerable agitation among the oil interests here. The bill is said to especially favor the Pearson company, which purposes to export oil to Europe, although at present it imports crude oil from the United States as the supply from the fields in Mexico is not sufficient to meet the demands of the local trade which is taking advantage of the low prices resulting from the rate war with the Waters-Pierce company. It is claimed that if this bill is passed it will have the effect of retarding development by the independent producers and exploration companies.

The American Smelting and Refining Company has secured an option on the Angangueo mine, Michoacan, controlled by M. Elsasser, T. Ryder and others. Alexander W. Edelen, former superintendent of the smelting company's property at Bonanza, Zacatecas, has been placed in charge at Angangueo.

Engineers representing John Hays Hammond and associates are examining the Babylonia gold mine near Carrizal, Michoacan. This property was originally denounced in the state of Guerrero, but later was proved to belong to the state of Michoacan and subsequently denounced there by other parties. The original claimants, of whom Major Cueller of the President's staff is the principal, are generally conceded to have the prior rights.

Work on the Taviche branch of the Mexican Southern Railway is progressing and it is expected that the line will be in operation by Jan. 1. When this line is completed the construction force will be transferred to the Tlacolula branch which is already located as far as the smeltery at Magdalena.

A circular was issued recently by the joint management of the Douglas Copper Company and the Mexican Exploration and Mining Company for the consolidation of the two companies and the forming of a new company, the Pacific Smelting and Mining Company, capital $6,000,000 common and $2,000,000 preferred stock, all shares par $5. The preferred stock is 7 per cent. cumulative and preferred, both as to dividend and principal, and convertible, at the option of the holder into common stock at par after Jan. 1, 1911, and redeemable at 110 per cent. and accrued dividends March 1, 1911, or on

any other dividend date thereafter. This preferred stock is offered to the bondholders of both companies at the ratio of $1.25 of preferred stock for each dollar in bonds exchanged, and the balance to be used for treasury purposes if needed. The common stock to be offered for the stock of the Douglas Copper Company in exchange, share for share, and for the stock of the Mexican Exploration and Mining Company at the ratio of three shares of the Mexican Exploration and Mining Company's stock for one share of stock in the new company. This plan will still leave in the treasury of the Pacific Smelting and Mining Company over $600,000 of preferred stock and $1,500,000 of common stock. The properties that are owned, or partially owned by the Douglas Copper Company in Sonora are the Anita Copper Mines Company, Ltd., and the Compañia Metalurgica y Refinadora del Pacifico, S. A., with a 350-ton smelting plant at Fundicion, and a number of timber grants. The consolidation also includes the Yaqui Mining Company and its concessions in Sonora, owned largely by the Mexican Exploration and Mining Company.

Monterey, Mexico

Oct. 30—The last year has been one of extreme dullness in mining. Only a few of the larger mines have been working and little or no new work has been started. The Cruz del Aire mine at Sabines Hidalgo is installing an aërial tram to transport the ores from the mine patios to the loading station of the ox-teams, and the mine will ship 2000 tons per month. The lead ores (about one-half) will go to the American Smelting and Refining Company at Monterey and the zinc ores to the United States. The Fraternal at Lampazos continues to ship lead ore, but discontinued shipping zinc ore about July 1. The mine has a stock of about 4000 metric tons on hand which it will begin to ship shortly.

The San Pedro mines, of the Mexican Lead Company, close to Monterey, had been shipping regularly about 1200 or 1500 tons of lead ores to the San Luis Potosi smeltery, but the railroad to these mines was washed out by the floods of August and is not yet repaired. The mines expect to be able to resume shipments Nov. 1. The Cabrillas, at Cabrillas, has been shipping steadily and the Paloma, at the same place, has been shipping about 1000 tons per month to Monterey. A new body of ore that carries about 17 per cent. lead has been opened at this mine. The ore is low in silver (about 150 to 180 grams per metric ton), but carries an excess of iron. The Minas Viejas at Villa Aldama is working steadily. The product (zinc ore) is calcined for shipment to Europe. In an old mine on Mitre mountain near Monterey an important strike was made a short time ago. It is a silver-lead ore of good grade.

In regard to zinc, the rise in the price of spelter has allowed the buyers to offer nearly as good prices as they were giving previous to the imposition of duty by the United States, so that there is a healthy activity in this metal. As all the large producers have sold their ores, the ore buyers are trying to lease or buy promising prospects and mines. There has been considerable talk about shipping ore to Europe, but I do not know of any ore that had been shipped to the United States that has been diverted to Europe. A. E. Houser, local representative of L. Vogelstein & Co., of New York, has been successful in getting contracts and is shipping all ores to the United States, as usual. He predicts a boom in zinc for the coming year, and by the signs seen at present, I should say that the movement has already begun.

London

Oct. 25—The Institution of Mining and Metallurgy has been in winter session. Two papers were presented for discussion, one by Dr. James Douglas, on the "Influence of the Railroads of the United States and Canada on the Mineral Industry," and the other by W. A. Caldecott, on the "Development of Heavy Gravitation Stamps." The selection made by the council for the annual awards of the institution was announced. The institution gold medal, the highest award, is awarded to Prof. William Gowland, in recognition of his services to education and to metallurgy. The gold medal founded by the Consolidated Goldfields of South Africa, Ltd., was awarded to W. G. Caldecott, a metallurgist in the employment of the founders for his work in connection with the treatment of gold ores. A prize was also awarded to C. O. Bannister and W. N. Stanley for their paper entitled, "Cupellation Experiments," and "The Thermal Properties of Cupels."

At a general meeting of the shareholders in the Spassky Copper Mine, Ltd., accounts to Sept. 30, 1908, were presented, and the chairman anounced that the affairs of this company in Russia, after years of trouble, had taken a turn for the better. Construction costs had exceeded the estimates and had impaired the resources and credit of the company. A strike of workmen, both in 1907 and 1908, contributed to the failure of the company to secure the production of copper that was originally estimated might be obtained. The construction program has now been completed.

During the year under review the production of copper was 1322 tons, which realized an average of £77 13s. 8d. per ton. E. T. McCarthy, engineer to the company, reported that satisfactory progress was being made both as regards reduction in costs and improvements in methods, and expected that the production of copper during the next six months would be about 1100 tons, after which a substantial increase might be expected. One of the principal difficulties that the company has had to face has been that of transport between the mines and the smelting works. The construction of a railway, at one time considered necessary, has been abandoned as cart transport for the ore is now easily secured. Some difficulty was experienced in getting coal by the railway from the Kavagandy colliery, owing to the poor condition of the line, but this has now been remedied. The present output is between 5000 and 6000 tons monthly.

Regarding the Guspenssky mine of the company, Manager H. C. Woolmer, in a report dated August, 1909, says that the main shaft has been sunk to the 60-sajeen level (420 ft., one sajeen equaling 7 ft.), where a large chamber has been excavated and a crosscut started to cut the orebody which, judging by the satisfactory assays of cores of diamond drills, should open up high-grade ore. The shaft has been sunk 30 ft. below the 60-sajeen level, and it is hoped to reach the 70-sajeen level (490 ft.) in the course of another two months. For the first seven months of the present financial year 9900 tons have been raised, but the production will be considerably increased as soon as the new levels are opened out. The average cost of production of copper in Russia was, during 1907-8, 10.22 rubles per pood. During March, April and May of this year the cost has averaged just under 6 rubles per pood, showing a great reduction for which the company has to thank its new smelting superintendent, F. C. Knight.

In studying the affairs of a company like Spassky, it is impossible not to be struck by the multifarious duties that a mining engineer is called upon to perform. To manage a property in Russia mere technical knowledge is not enough. He must have other qualities than those to make a successful general manager. He must be an organizer, a diplomat and a financier as well. He must be an organizer, a as well. When one reads of the dispersal to their homes of a considerable population who had congregated in the building of the company, of two strikes of workmen, of an outbreak of cattle disease at a place where the furnaces are dependent on cattle transport, of a railway line which supplied the fuel being blocked with snow and worked with antiquated rolling stock, one realizes that with such problems as these to face the daily life of a mining engineer is no bed of roses. The Spassky is perhaps an exceptional case, but there are many mines all over the world where the duties of the manager extend over many matters outside of mining engineering, the inability to grapple with which would mean financial disaster to the mine. It is to the credit of the profession that competent men are forthcoming when wanted —and Spassky is a good example—fully qualified to fill responsible and arduous positions. It is safe to say that no other profession calls for such varied accomplishments as that of a mining engineer.

Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents

THE CURRENT HISTORY OF MINING

Alaska

Nome—A strike is reported on Nolan creek and a new town called Wright City has been established.

Fairbanks—On the property of the Jupiter Mars Consolidated Mining Company, three shafts are down on a vein which shows 6 ft. of free-milling quartz.

Kasta Bay—The Goodroe mine made its first large shipment of ore consisting of 2500 tons. The ore is copper and gold.

Ketchikan—The Salzer, Mount Andrew and It mines are making regular shipments.

California

AMADOR COUNTY

Bunker Hill—The clean-up of the mill of this company for September was $1300 per stamp for the 20-stamp mill.

BUTTE COUNTY

Bills—This mine on the north side of Little Kanaka Peak, near Enterprise, will be reopened by W. F. Burke.

Phoenix—This mine near Hurleton, owned by W. F. Burke, continues to yield about $1000 per day.

CALAVERAS COUNTY

Reiner—The blue-gravel channel has been found under 30 ft. of cement and the old works on the mine drained.

Red Gold—This mine, west of Murphy, is to be reopened.

Cuneo—This mine, near Murphy, is running full handed and the mill is nearly completed.

MARIPOSA COUNTY

Hite Cove—This company, John Mason, superintendent, has started work on a new road from the mouth of the South Fork to the mine. Thirty-two men are at work in the mine and mill and 20 of the 40 stamps are running.

NEVADA COUNTY

Conlin—This property in Grass Valley has been shut down two years, but H. G. A. Brunnier expects shortly to start up again.

Brunswick—The new three-compartment shaft on the Matteson ranch, which is to be 1200 ft. deep, is under way. It will take two years to finish.

PLACER COUNTY

Piute—J. Riddle, lessee of this drift claim, is taking out some good gravel, but has not yet reached the main channel.

Ophir District—After a long idleness the Hathaway mine has been started up again. The Crater mine is installing new machinery, and the Crandall mine has been sold to Colorado men.

SHASTA COUNTY

Sisson Exploration and Development Company—In the north drift of tunnel No. 3 this company is now crosscutting the orebody. The vein contains ribbon quartz.

SIERRA COUNTY

Dreadnaught and Seneca—These two mines at Alleghany have been bonded to C. D. McGonigal, of Custer, S. D. Both of the mines were at one time producers. Mr. McGonigal has also bonded the Rose mine at Pike City in the same district as the Alaska mine.

Phoenix—W. A. Wood, in behalf of an English company, is about to purchase this mine at Sierra City. It is low grade.

Brush Creek—An Eastern company now holds the bond on this property near Mountain House. The property was a producer many years ago, but excess of water caused a shut-down.

Alleghany District—A combination has been effected of the Gold Canyon, Gold King, Happy Jack, St. Elmo, Steamboat, Golden Crown and the Sherman properties. Jerry Culbertson, of Kansas City, is president, and R. H. Case the consulting engineer. The Gold Canyon mill has commenced crushing ore.

SISKIYOU COUNTY

Czarina—At this property, Salmon river district, H. Severman, superintendent, 25 men are at work, and the 10-stamp mill is operating steadily. Ten more stamps will be added.

TRINITY COUNTY

Bullychoop—Work has been resumed after a shut-down of some months. The mill will not be started up now.

TULARE COUNTY

Brushy Ridge—This mine on Mill creek, M. Finnegan, manager, is showing a satisfactory body of free gold ore, the highest grade of which will be shipped. There is no mill on the property.

Colorado

CLEAR CREEK AND GILPIN COUNTIES

Stanley—The entire plant and mine has been put in working order by Manager Bowden. The pumps are handling 500,000 gal. of water daily.

Bellevue-Hudson—The property has been sold to the Southwestern Mines Corporation, of Boston, for $150,000. M. W. Mouat, Georgetown, is manager. Among the plans is the erection of a 100-ton mill.

Mammoth—This group has been sold to the Argentine Exploration Company. B. J. Martelon, Georgetown, manager. The aërial tramway will be repaired and a 25-ton mill built.

Gilpin-Eureka—The stockholders have decided to erect a mill, to cost $25,000. G. W. Mabee, Central City, manager.

Freedom—C. E. Major, of Central City, has taken a bond and plans for liberal developments of this property in Gilpin county are under way.

Chase—An examination of this mine is being made by Forbes Rickard, of Denver, in the interests of Eastern capitalists.

Grand Union—A transfer of the property has been made to J. H. Elspass, of Denver, and machinery is to be installed.

LAKE COUNTY—LEADVILLE

Chemung—Work has been resumed on this property on Breece hill and drifting north and south from the bottom of the shaft, 500 ft., is in progress.

Garbutt—Shipments of a fair grade of sulphide ore are being sent daily, all from the lower levels, 750 ft. A large body of low-grade ore is being developed close to the Little Johnny line.

Highland Mary—Drifting is being carried on both ways from the shaft to determine the length of the orebody. The ore that is being extracted is said to run 2½ oz. gold per ton.

Vinnie—The shaft will be sunk from 430 ft. to 700 ft. A compressor and electric hoist have been installed.

OURAY COUNTY

Oom Paul—The property has resumed shipments and is carrying on extensive development.

ROUTT COUNTY

Battle Era Mining Company—The company at Craig, Colo., intends to install machinery, as well as build an electric line from coal mines to the railroad. Slack will be used to generate electricity for power for mines and railroad.

SAN JUAN DISTRICT

Bullion King—High-grade gold and silver ore is reported to have been encountered at a point 3500 ft. from the portal of the main tunnel on the Lake View lode. The gold is in white quartz, and the vein is 4 ft. thick.

Revenue—The mill is being put in shape and extensive underground work is being done preparatory to running the mine on company account. From the Montana vein about 100 tons daily is coming for the 60-stamp mill which is operated half capacity. A. E. Reynolds, manager.

TELLER COUNTY—CRIPPLE CREEK

El Paso Consolidated—Allen Burris, president states that 40 sets of lessees are at work on the property. During July, August and September, 4775 tons of $15 ore were shipped.

Keener—The company has blocked out its ground on Battle and Squaw mountains for leasing.

American Eagle—A 30-ton shipment of ore running from four to six oz. in gold has been made from the lease of the Colorado Investment Company.

Georgia

LUMPKIN COUNTY

Barlow—John Jackson is sinking a shaft to open the Ogle vein on this land, near Dahlonega.

Chestatee—M. Seawell has begun work on a dredge to operate on the Chestatee river below the Calhoun dam. The dredge will be completed early next year.

Lockhart—R. and J. McDonald are putting in a hydraulic elevator to work the placer ground on the Lockhart, near Dahlonega. They have prospected the ground thoroughly.

Idaho

SHOSHONE COUNTY

Black Horse—Grading for the 100-ton mill at the mine near Murray is almost completed. The machinery has been ordered, but will probably not be installed until spring. On the lower level of the mine an orebody has been exposed for 200 feet.

Donlan—The antimony mine, 15 miles east of Burke, will resume shortly, after a shutdown of 17 years. There is a smelting plant on the property, but no satisfactory results have ever been obtained from it, and experiments are now being made which, if successful, will result in the bonding of the mine.

Snowshoe—The company is about to give a lease for the opening of this property.

Hercules—The company has leased the Tiger mill at Burke for one year. The company will have to furnish its own power since the lease does not include the water rights. Large capacity ore bins will be constructed at the mill.

Coeur de'Alene-Northfork—The ore bins at the Monarch mine, near Murray, have been completed and the flume repaired. The capacity of the mill is being increased to 200 tons daily, and it is planned to start operations within a month. From the 800-ft. level a raise is being driven to the surface.

Last Chance—The tailings plant recently built will be started soon, and it is expected that two tons of concentrates will be produced daily. The tailings will be taken down the river to a dock recently built. The machinery has been roofed over and it is planned to continue operations throughout the winter.

Coeur d'Alene-Vulcan—A strike has been made 1100 ft. from the tunnel portal at a depth of 800 ft. The vein is from 12 to 14 in. wide, and contains copper, lead, silver and gold.

Illinois

The new mining investigation commission, which was created for the purpose of investigating the methods and conditions under which coal is mined in Illinois with special reference to the safety of human lives and the conservation of the coal deposits, and for the further purpose of submitting to the next general assembly a revision of the coal-mining laws has been appointed as follows, three members being coal-mine owners, three coal miners, and three unidentified with the interests of either owners or miners: Dr. J. A. Holmes, technological branch Geological Survey, Washington; H. H. Stoek, University of Illinois; Prof. Graham Taylor, Chicago; John H. Walker, Springfield; Bernard Murphy, Pana; Charles Burch, Eldorado; Richard Newsam, Peoria; Glenn W. Graer, Chicago; J. W. Miller, Gillespie.

Indiana

GREENE COUNTY

Island Valley—A record of running every day since last April has been made. The company has many orders to fill and is making an effort to keep up with them. The new rule prohibiting the closing of a mine to attend a funeral has been put into effect at this mine.

KNOX COUNTY

With the financial support of 75 citizens behind it, the recently incorporated Palmyra Coal and Development Company of Frichton, intends to develop new coalfields in southwestern Indiana. The first shaft will be sunk near Frichton. The company is capitalized at $500,000. The company already holds coal leases on 7000 acres of land underlaid with coal. At a recent meeting the following directors were elected: J. L. Robinson, Charles Nicholson, W. M. Myers, H. M. Simpson, Edward Ruble, Brazil Gaither, E. C. Gilmore, Frank Thorne, Willus Russell and Nowland McClure.

PIKE COUNTY

In drilling an oil well on the Hurt farm, five miles east of Oakland City, the drill passed through three veins of excellent coal. The first vein was found at 64 ft., and is 6 ft. thick; the second at 160 ft. and is 9 ft. thick, while the third is a 7-ft. vein at a depth of 205 ft. Steps have been taken to develop the find.

VANDERBURG COUNTY

Coal shipments to the northwest from the mines in the southern district along the Evansville & Terre Haute railroad have reached over 300 carloads a day, and there is a scarcity of all kinds of cars on that road. Much of the coal is being shipped out in box cars. There is not an idle coal miner in the county except from choice.

Kansas

Big Six—This company is developing deep ore on the 17-acre lease on the Murphy land north of Galena. The ground has been proved with drills to 280 ft. and the shaft is being sunk. A 250-ton mill will be erected.

Michigan

COPPER

Section 12—The diamond drill has encountered a conglomerate formation carrying small particles of copper at a depth of about 600 ft. This drill is sinking to expose the Baltic lode which it is expected it will cut within the next 200 feet.

Ojibway—The drift from the 800-ft. level of No. 1 shaft has passed out of the copper-bearing portion of the lode and has been slightly turned to again pick it up. This drift is now in a faulted zone. No. 2 shaft drift from the same level continues in the same grade of ground, about half of the ground opened carrying commercial copper. Both shafts are sinking below the 1200-ft. level, and at a depth of 1250 ft. levels will be established and sinking temporarily suspended. The ground down to that depth will be fully opened and, in all probability, a mill run will be made.

Atlantic—The stamp mill is being remodeled under the supervision of the Calumet & Hecla management to eliminate as far as possible the tailing losses in the treating of Superior rock. A Harding mill is to be installed for regrinding purposes and a Woodbury classifier. This type of classifier was originally worked out at the Calumet & Hecla mills and materially reduces the quantity of water used. With these changes in commission a much better mineral return should be made.

Quincy—This mine has started the remodeling of the concentrating department of its stamp mills to take care of the increased tonnage brought about by the enlargement of the stamp-head cylinders from 18 to 24 inches. Five heads have been equipped with these enlarged cylinders and are working satisfactorily.

Indiana—The diamond drill has encountered a copper-bearing amygdaloid formation at a depth of about 575 ft. This was reached after passing through a conglomerate in which the drill has been working since it entered the ledge. This

conglomerate formation carried small lenses of sandstone which were impregnated with small particles of copper. The identity of the new strike cannot be determined from the present data, and drilling will be carried on to ascertain what may be expected from it. The property is well located and has the advantage of a shallow overburden so that little difficulty will be experienced in shaft sinking.

Lake—The crosscut from the 5th level has been extended about 150 ft. and has entered the formation for over 50 ft. without reaching the hanging-wall. The crosscut will be continued until this is reached, when drifting on the lode will be started. The first few feet opened in this crosscut showed an exceptionally rich state of mineralization and the balance has been in a good grade of stamp rock with some small masses. The shaft is sinking in the footwall trap at a depth of about 780 ft. Openings from the levels above continue in good ground and show a lode averaging about 60 ft. in width.

White Pines—This property, which is being opened by the Calumet & Hecla, has reached a depth of about 150 ft. and has started lateral openings. The formation is carrying copper in encouraging quantities.

Wyandot—The crosscut that is being driven from the 700-ft. level of the exploratory shaft has passed through a copper-bearing amygdaloid formation. This formation is about 28 ft. wide and shows a good grade of copper ground on both hanging- and footwall side, while in the middle results are not so good. As this strike is in close proximity to the point where it is believed that the extension of the lake will traverse these lands, results of drifting on this lode, which will be undertaken at once, will be awaited with interest.

Missouri

JOPLIN—ZINC-LEAD DISTRICT

Delta—This mine at Spring City has been leased and will be reopened by Creech & Co., of Joplin.

Herrod & Babron—Drilling on these lands south of Webb City has opened new ore and extended the known sheet-ground area southward.

Montana

BEAVERHEAD COUNTY

Dacotah—The property in the Polaris district is running a 480-ft. tunnel to cut the vein at 247 ft. A 20-ton chilean mill and accessory equipment are stored in Dillon.

BUTTE DISTRICT

Davis-Daly—The Great Northern Railway has petitioned the Butte council for permission to run a spur from its main line to the Colorado shaft of the Davis-Daly Company in the heart of the city. Opposition to the spur has been made. The Great Northern runs through Basin, Mont., where is the Heinze concentrator to which the Davis-Daly ore will probably be shipped.

JEFFERSON COUNTY

Elkhorn Silver—One hundred and fifty men are employed at the property and the 20-stamp mill is operating full capacity. Shipments are being made to East Helena.

LEWIS & CLARK COUNTY

Bail Mountain—Sixty men are employed and the 20-stamp mill is treating about 125 tons daily.

LINCOLN COUNTY

Fisher Creek—The company owns six quartz and three placer claims at Bramlett creek 35 miles south of Libby. The present 20-stamp mill will have its capacity increased to 100 tons per day and a 200-h.p. electric plant will soon be installed.

Nevada

ESMERALDA COUNTY—BLAIR

Mitchell & Fairfield—The firm has an option on a group of claims known as the Blair No. 4, Four Timer, Daisy, Gold Bar and Alamo, owned by W. A. Ingalls *et al.* They have also taken an option on a group of four claims owned by T. L. Oddie. Development will be started to ascertain the value of the ground before exercising the option.

Pittsburg-Silver Peak—Twenty stamps are to be added to the mill. This gives the mill 120 stamps. Edmund Juissen is manager. The improvements will be finished in 90 days.

Spring Hill—DeWitte & Thomas, operating this property, have made a test shipment of 25 tons of ore to the mill of the Pittsburg-Silver Peak Company. The ore was taken from several different openings, the test being made to determine what grade of ore could be shipped at a profit.

ESMERALDA COUNTY—GOLDFIELD

Goldfield Consolidated—The preliminary work incidental to the installation of the six chilean mills is progressing rapidly at the Consolidated mill. The machinery is due Dec. 1. With this change the capacity of the mill will be increased from 650 to 900 tons per day. The Grizzly Bear company leasing upon the Grizzly Bear claim of the Consolidated has reached 750 feet. Sinking will be continued to the 1000-ft. level. The Mohawk and Jumbo vein systems are expected to be encountered at depth.

Jumbo Extension—The Goldfield Annex company, leasing upon this estate, has attained a depth of 540 ft. It is the intention to sink to 1000 feet.

Great Bend—The Diadem lease upon this property is sacking ore from a new vein recently encountered.

Goldfield Daisy—Milliard & Jones have been granted a one-year extension upon their lease. They are installing a new hoist and intend to direct their energies toward picking up the ore shoot formerly worked by Detch & Brewer on the same block. A new body of ore has been discovered on the 115-ft. level of the Goldfield Daisy shaft. Assays run as high as $200.

Nancy Donaldson—A depth of 125 feet has been reached in this shaft and a station is being cut preparatory to starting crosscuts toward the vein. John T. Hawkins is manager.

Crackerjack—Mitchell and Fairfield, leasing upon this property, have been given an extension of 6 years upon their lease, making it expire Nov., 1915. The size of the block has also been increased, and they now have a block 600x1200 ft. Assays running from $3 to $12 per ton are frequently obtained.

Pittsburg-Nevada—This company is crosscutting at 400 ft. The entire length of the level is in vein matter and some gratifying assays have been obtained.

Atlanta—The shaft upon the Garrison or Precious Metals company's lease has attained a depth of 575 ft. and sinking is still being continued. The bottom of the shaft is in dacite.

Florence-Goldfield—As soon as the additions are completed the mill will have a capacity of 200 tons per day. Brussels carpets have succeeded the use of amalgamation on plates, and are now making as good a saving of the free gold as the latter, and at a much less expense and trouble. The disposition of tailings has been a difficult problem and the company is now installing pumps and pipe line to transport the tailings to a point south of the mill where room is available. Willis Lawrence, superintendent.

HUMBOLDT COUNTY

Glasgow and Western Exploration Company—The company is developing its property extensively and operating the mill at Golconda. P. S. Macquisten is manager.

LANDER COUNTY

Austin-Manhattan—The Panamint vein has been cut in the Frost shaft at 85 ft. below the tunnel level, or 700 ft. from the surface.

NYE COUNTY

Round Mountain—The output for the first two weeks of October amounted to $23,000. A new vertical vein has been cut in the westerly portion of the property, and where it forms an intersection with the old flat vein at the 700- and 800-ft. levels some good ore was encountered.

Johnnie Mining and Milling Company—In order to increase the capacity of the mill a 10-ft. Chilian mill has been ordered and room is now being made for its installation. This addition will increase the mill from 90 to 120 tons per day.

STOREY COUNTY

Cosmopolitan—This property in the Brunswick district has been sold to George Drysdale for $12,000. The claim is east of the Baker.

WHITE PINE COUNTY—ELY

Boston-Ely—The old officers were re-elected at the recent annual meeting. The Emma shaft is down 990 ft. Commercial ore is not expected before 1200 feet.

Ohio

Columbus & Hocking Coal and Iron Company—In Columbus, Oct. 23, the directors elected Henry Stanley Haskins president to succeed N. L. C. Kachelmacher, who is retiring because of ill-health. President Haskins will make his headquarters in New York and the operation is to be divided among three departments to handle separately the coal, brick, and oil business. The new arrangement will go into effect Nov. 1. Other changes in the officers were the promotion of former secretary and treasurer A. L. Thurman to the vice-presidency and the election of F. J. Shaffer director.

Oregon

BAKER COUNTY

Independence—Rich ore has been found in this mine. One oreshoot is 380 ft. long.

JOSEPHINE COUNTY

In the Galice district, 25 miles from Grants Pass, developments are under way on the Alameda, Oriole, Gold Road and Sugar Pine properties. Additional mill capacity is being provided for the camp. The smeltery for the Alameda is now being erected. An important deal involving the Old Channel placer property, more than 1000 acres, has been concluded. The price to be paid is reported to be $150,000. This property is completely equipped, using "giants" under 510-ft. head. Much prospecting is being done on Peavine mountain in this section.

Pennsylvania

ANTHRACITE

Hammond—The Philadelphia & Reading Coal and Iron Company, which works the Hammond colliery under lease from the Girard estate, has let a contract to Dolan Brothers, of Pottsville, to sink a shaft 1250 ft. deep, to reach the lower vein, which has not heretofore been worked. This will be the deepest shaft in that part of the anthracite field.

BITUMINOUS COAL

Pittsburg Coal Company—The financial statement for the nine months ended Sept. 30 is as follows:

	1908.	1909.	Changes.
Net earnings..	$2,106,791	$2,187,306	I. $ 80,515
Charges.....	1,971,562	1,956,705	D. 15,857
Surplus.....	$ 135,229	$ 231,601	I. $ 96,372

The charges this year were made up as follows: Depreciation of coal lands, $497,788; depreciation of plant and equipment, $695,942; interest on bonds, $761,975.

South Dakota

Golden Reward—The Union shaft has been unwatered. The work was the joint undertaking with the Mogul and has been under way since June, when the workings were flooded by the rains.

Utah

JUAB COUNTY

Ajax and Gold Chain—These properties have been consolidated under the control of C. E. Loose.

SALT LAKE COUNTY

Rainbow Mining Company—The tunnel on this property in the Alta camp at 400 ft. has cut a vein of lead-silver ore. This in a part of the district in which no ore has previously been found.

SUMMIT COUNTY

Daly-West—The company has expended in the quarter ended Sept. 30, $152,575, including $28,316 for drain tunnel while the receipts were $128,316. Connection has been made from the tunnel level to the shaft and a station cut at the 1900-ft. level. The exploratory work has been satisfactory and it will soon be practicable to increase the milling operations.

Virginia

LOUISA COUNTY—MINERAL

Armenius—The new shaft has reached a depth of 150 ft. Ore is being mined from the 200, 860 and 960 levels. About 300 men are employed and from three to four carloads of pyrites shipped per day. Joseph B. Clearihius, manager.

Sulphur Mining and Railway Company—Development work is in progress and the vertical shaft has been sunk 250 ft. About 300 men are employed and somewhat reduced shipments maintained. J. H. Haskell is manager.

Allie Cooper—Capt. Boyd Smith has a small crew developing this old lead-silver property. The shaft is down 50 ft. and the vein has been drifted on for 100 feet.

PRINCE WILLIAM COUNTY—DUMFRIES

About six miles north of Dumfries the Plainfield Mining Company is opening up a pyrites property. The Austin Run Mining Company also has a force developing a pyrites orebody five miles to the south of Dumfries, in Stafford county.

Cabin Branch—The new 150-ton mill has been running since Sept. 16 and regular shipments of pyrites are being made. Sinking has reached 1500 ft. on the incline and a new hoist is to be installed. About 70 men are employed. John U. Detrick is manager.

Washington

OKANOGAN COUNTY

Allen Placer—This property on Mary Ann creek has been leased and a shaft will be sunk to bedrock.

FERRY COUNTY

Belcher—The company is planning the installation of a 400-ton smelter.

Duluth-Toroda—The mill at this property has been started. A. H. Perkins is in charge.

Copper Butte—An air compressor and pump have been installed at the mine and winter buildings erected.

STEVENS COUNTY

United Copper—A new vein has been cut at 400 feet.

Zodiac—The tunnel is in 1000 feet and in good copper-gold ore.

Canada

BRITISH COLUMBIA

Yankee Girl—Arrangements are being made for the construction of an aërial tramway from the mine in the Ymir district to the railway. About 2000 tons of ore have already been shipped to the smeltery. H. L. Rodgers is manager.

Fraser River District—Louis Pratt, of Vancouver, manager of a syndicate preparing for gold dredging on Fraser river, has completed arrangements for haulage from Ashcroft on the Canadian Pacific railway to the operations, between Big Bar and Dog creek, of about 400 tons of material for the construction of a dredge.

Skeena District—James Cronin, of Spokane, Wash., has sent in supplies for several men who will continue through the winter the underground prospecting of a silver-lead property under bond in the Babine range.

Cariboo—H. W. Dubois, representing Philadelphia capital, has let a contract for a long ditch and flume in connection with the supply of water for hydraulicking gold-bearing gravel near Quesnel forks.

Portland Canal—This company is erecting a concentrator four miles from tidewater. Construction of a railway from the head of the canal up Bear river, past the concentrator, has been arranged to be commenced in the spring. An aërial tramway from the mine, on Glacier creek, to the concentrator is being put in. Three tunnels are being driven in an orebody averaging 10 ft. in width. Where cut in No. 3 tunnel the ore shoot is 330 ft. below the surface. About 100,000 tons of silver-lead ore are already available for concentration. C. H. Dickie, Duncans, B. C., is managing director.

Red Cliff—In a big mineral zone there appear surface outcrops of three lenses of ore, into which workings have been driven from crosscuts. The last entered shows 27 ft. of copper ore at a depth of about 150 ft. The Canadian Rand Company has

contracted to supply a complete power plant, including four 35-h.p. vertical steam boilers, 12-drill compound air compressor, six machine drills with mountings, electric-lighting plant, etc. Delivery is to be made within three months. A. D. McPhee, Stewart, B. C., is superintendent.

ONTARIO—COBALT

Ore Shipments—Shipments of ore from Cobalt for the week ended Oct. 23 were as follows: Buffalo, 56,200; Coniagas, 60,900; Crown Reserve, 124,780; Kerr Lake, 120,215; La Rose, 513,701; Nipissing, 191,800; O'Brien, 128,100; Right of Way, 124,191 lb.; total, 1,319,887 pounds.

Temiskaming—The management has decided to sink to the 400-ft. level, the main shaft being now down 350 ft. The veins opened up at the 300-ft. level have proved equal to those above. Rapid progress is being made with the installation of the new concentrating mill and only high-grade ore has been shipped for some time.

Waldman—The shaft is down 85 ft. and a station has been started at the 75-ft. level. It is expected that the station will cut into the vein that dipped at 60 ft. in the shaft. Eight tons of ore are now sacked.

Nipissing—The new vein No. 114 on being further uncovered has shown great improvement, being 6 in. wide and rich in native silver. It will be reached underground by crosscutting from vein No. 26, which is within 100 ft. and is likely to be a heavy producer.

Eastern Cobalt—This company will commence putting in machinery preparatory to commencing operations in the spring.

Otisse-Currie—A new vein, not located on the surface, is reported to have been cut on the second level. It is said to average 3 to 4 in. in width, carrying cobalt and silver.

Station Grounds Mining Company—A shaft will be sunk on this company's property near the tracks. It is understood that the diamond drilling carried on during the year has resulted in discoveries which have decided the management to follow this course.

ONTARIO—GOWGANDA

Much ore is reported to be ready to ship from Gowganda, the chief producers being the Boyd-Gordon, Reeves-Dobie, Blackburn and Mann properties. The new government road to this camp is now complete and will greatly facilitate transportation during the winter.

ONTARIO

Northern Pyrites Company—This company has commenced shipping ore over the Grand Trunk Pacific Railway from Vermilion lake to Fort William, from which point it is exported by water to the plant of the General Chemical Company, Detroit. The company has a contract with the railroad to handle 30,000 tons before the close of navigation. About $200,000 has been spent this season in the development. C. C. Whittier is engineer.

Mexico

CHIHUAHUA

Las Vigas—Engineers, supposedly in the interest of the Phelps, Dodge & Co., are making an extensive examination of this copper property along the Orient railway in the eastern part of Chihuahua.

Lluvia de Oro—The company has purchased a hydroelectric plant. The Fuerte river will be dammed to provide a 40-ft. head for the turbine and the power will be transmitted electrically five miles to the mill. H. R. Conklin is manager.

COAHUILA

Jimulco—This mine is shipping about 1000 tons a month to Aguascalientes. The ore is found in limestone cave deposits and extensive development is necessary in order to keep a proper reserve. Plans are underway to prospect the grounds northeast of the main workings which have been cut by a fault. The company has built a narrow-gage railroad from the mine to the Mexican Central at Otto, using a Shay locomotive and running on grades up to 8 per cent. and an average of over 6 per cent. Arthur C. Tuttle is general superintendent and J. B. Moore, local superintendent.

Coahuila Mining and Smelting Company—The report that the smeltery at Viesca was planning to resume is authoritatively denied.

DURANGO

San Fernando—This property controlled by J. T. Canfield, Cullican, Sinaloa, will install a mill with concentration and cyanide plant. Hydroelectric power will be used.

Guanacevi—Four milling plants are now operating. The large operations are those of the Mexico Consolidated company, Ayton & Chevrillon and the Durango Milling Company.

GUERRERO

Suriana Mining and Smelting Company—This company owns the Achotla mines, 54 miles down the river from Balsas. A lead furnace, 36x60 in., is being erected to treat the oxidized gold-silver ore developed. Ore over $100 a ton is shipped. J. Gordon Hardy is engineer.

MEXICO

Los Arcos—Work has been suspended on this mine at Zacualpan.

SONORA

Greene-Cananea—The company has completed the hydraulic-fill dam made from tailings for the impounding of water for the concentrators.

Belle Union—The lease has been transferred to W. A. Tucker, of Nacozari and several cars of high-grade copper ore is being sent to the Douglas each month. The mine is owned by the Moctezuma Copper Company and is eight miles from Nacozari.

San Jose—About 50 tons a month of converter lining is being sent from the Oris mine six miles east of Nacozari.

Churunibabi—This mine of the Moctezuma company is shipping about eight cars a month of converter-lining ore to Douglas.

SINALOA

Panuco—Dividends are now being paid at a rate of 50,000 pesos monthly. The company has been operating in the Concordia district for 30 years, and has distributed to stockholders 10,000,000 pesos.

Santa Cruz—A 10-stamp mill is in operation at the mines 50 miles from Mazatlan.

Butters Copala—The new reduction plant is handling 250 tons daily. The tonnage will be increased until the capacity of 400 tons is reached. Accidents to mill machinery have retarded operations.

South America

BRITISH GUIANA

Gold exports from the colony for the nine months ended Sept. 30, were 48,769 oz. bullion in 1908, and 46,915 oz. in 1909; a decrease of 1854 oz. The bullion reported this year was equal to $814,677, or 39,414 oz. fine gold. Exports of diamonds for the nine months were 4343 carats, valued at $28,197; an increase of 974 carats over last year.

PERU

Cerro de Pasco—The company is producing about 2000 tons of copper monthly, all of which is shipped to the United States for refining. The Haggin-Hearst interests control the company.

Africa

RHODESIA

Gold production in Rhodesia in September is reported at 50,631 oz. fine, making a total of 458,891 oz. for the nine months ended Sept. 30. Last year the reports were partly in bullion. By values the comparison is $9,375,901 in 1908, and $9,485,277 in 1909; an increase of $109,376 this year. The production of other metals and minerals in September was: Silver, 23,150 oz.; copper, 5 tons; lead, 91 tons; tungsten ore, 11 tons; chrome ore, 5264 tons; asbestos, 30 tons. The output of coal was 16,691 tons.

WEST AFRICA

Gold production of Ashanti and the Gold Coast in September is reported at 18,125 oz. bullion, an increase of 359 oz. over August. For the nine months ended Sept. 30, the total output was 224,524 oz. in 1908, and 184,563 oz. in 1909; a decrease of 39,961 oz. The bullion reported this year was equal to $3,624,041, or 175,329 oz. fine gold.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, Nov. 3—The coal trade in the West continues active, the demand for domestic coal for the winter having fairly started in most of the larger towns and consuming centers. Steam coal is also in very good demand. Prices still continue to be held down by heavy stocks and heavy shipments from mines. The shipments, however, are being curtailed to some extent by the scarcity of railroad cars which is beginning to be felt quite severely in many parts of the West, especially in Ohio and Indiana.

The bituminous trade in the East also continues to improve. Steam-coal demand is better. Car shortage is felt here though the railroads claim that they are making some improvements in conditions.

The anthracite trade is steady and without special incident. Shipments to the Lake Erie ports are being rushed just now in view of the approach of the close of navigation.

Lake Coal Trade—A rush is on in the Lake coal trade, and shippers in the Lake Erie ports are almost overwhelmed. Dock room is scarce, delaying shipments, and to add to the trouble, cars are becoming scarce. It looks as if November would be a month of rush under various difficulties.

Coal Traffic Notes

Coal and coke tonnages originating on Pennsylvania railroad lines east of Pittsburg and Erie, year from Jan. 1 to Oct. 23, short tons:

	1908.	1909.	Changes.
Anthracite	4,163,779	3,938,421	D. 225,358
Bituminous	27,070,636	29,647,927	I. 2,577,291
Coke	5,620,934	8,929,385	I. 3,308,451
Total	36,855,349	42,515,733	I. 5,660,384

The total increase this year to date was 15.4 per cent.

The Pittsburg Coal Company reports tonnages of coal and coke for the nine months ended Sept. 30 as follows:

	1908.	1909.	Changes.
Pittsburg district	9,726,387	9,718,334	D. 8,053
Hocking district	773,588	681,465	D. 92,123
Total coal	10,499,975	10,399,799	D. 100,176
Coke made	5,370	344,079	I. 338,709

The company's coke ovens were practically closed down for the greater part of last year.

New York

Anthracite

Nov. 3—The cold snap has passed, but it has still left some traces in an increased demand for coal from dealers and in larger deliveries to consumers. Otherwise the trade is quiet and steady as usual.

Schedule prices for large sizes are unchanged at $4.75 for lump and $5 for egg, stove and chestnut, all f.o.b. New York harbor. For steam sizes quotations are: Pea, $3.10@3.25; buckwheat, $2.25@2.50; No. 2 buckwheat or rice, $1.75@2; barley, $1.35@1.50; all f.o.b. New York harbor.

Bituminous

The taking of coal seems to be again on the increase. In considerable part this is due to the call for quick shipments from the shoalwater ports, which are beginning to realize that time is short. In all New England territory, however, the mills seem to be requiring more coal, and even New York harbor is more active. All-rail trade continues steady.

Prices are firmer without any actual rise, except in the case of a few coals for which there is special demand. Sellers, however, are not disposed to cut prices as much as they were.

Car supply is still troubling producers' minds. On some roads it is better than on others, but none seem to have cars to spare. Transportation is not particularly good, coal coming through slowly.

Coastwise rates still continue low, vessels being easy to get. An advance was expected on account of the season, but has not yet been made. New York quotes on small vessels 50c. to points around Cape Cod, with 5c. or 10c. more for a few special points. Philadelphia reports 60@65c. for large boats to Boston, Salem and Portland.

Birmingham

Nov. 1—The scarcity of labor and the shortage of cars are the principal matters under discussion in the Southern coal market. There is a good demand for coal. The mines in operation are doing well, but there is need of labor and the railroads cannot furnish all the cars wanted.

Coke is strong, the demand being heavy and the production not quite sufficient. The Tennessee company, during the past week, lighted up 350 coke ovens in this State, which have been idle for several years. Every effort is to be made to increase the production of coke.

Chicago

Nov. 1—The coal market continues in good condition for the wholesaler, although there is growing complaint about the lack of cars and the weakness of fine coals. Demand, however, is good for both steam and domestic coals and there continues to be a wholesome absence of overshipments of the coals most in demand. The tendency on lump coals is toward higher prices and the greater part of Illinois and Indiana lump is selling for 10 or 15c. higher than a week or two ago. Screenings from these States, on the contrary, are perhaps 10c. lower on the average.

Lump and egg from Illinois and Indiana bring $1.90@2.75; run-of-mine sells for $1.65@1.75, and screenings are not easily sold at 95c.@$1.10, in car lots.

Hocking remains strongest of coals from east of Indiana, being much in demand at $3.15. Smokeless is in better demand than for many weeks, and is selling at $3.60@3.80 for lump and egg, and $3.05@3.15 for run-of-mine. Youghiogheny ¾-in. gas at $3.15 and Pittsburg No. 8 at $2.55 for the same size are quiet. Anthracite is selling well, with a steady demand in both city and country and small sizes much in demand.

Cleveland

Nov. 2—There is almost a deadlock in the Lake trade. Rush orders are coming in, but cannot be filled, partly owing to scarcity of cars and partly to the want of dock room to load. It looks very much as if the coal supply of the Northwest would be short when navigation closes. All is rush here now, with some confusion.

Local trade is active, but with little change of prices, except an advance of 25c. on Massillon coal for domestic use.

Indianapolis

Nov. 1—The conditions in the Indiana mining districts are gradually assuming a good state. The mines are all working full time except when a car shortage occasions a cessation.

There is complete harmony now, where a year ago there was bitter warfare between the National and State administrations of the United Mine Workers, and to celebrate the coming together of the factions 72 miners under suspension were reinstated and granted cards enabling them to work. These men were suspended for appealing to the courts when their organization officials decided against them and collected fines according to the wage contract.

Pittsburg

Nov. 2—The coal market became highly excited last week, the car shortage suddenly growing acute, and prices made the sharpest jump for a long time, fully 15c. a ton. Pittsburg district is now quotable at $1.25@1.30 for mine-run at mine, and 75c. for slack, Freeport being quotable at 95c.@$1. The general supply of cars is decreased, while there is a special rush to get coal to the Lakes before the close of navigation, making the scarcity of cars for the general trade acute. The market will probably ease off somewhat when the Lake trade is over.

Connellsville Coke—The market remains firm, but has not been active as to contracts. Demand for prompt furnace coke has increased. There is no difficulty in obtaining $2.75 for prompt furnace coke and $2.85 is sometimes secured, the market for prompt and balance of year being quotable at $2.75@285. The only contract for next year reported during the week was at a cut price, 5000 tons a month over the first half for a small eastern consumer, at $2.85 at ovens. Producers are firm in their former quotations of $2.90@3 for first half or all of next year. Occasional sales of foundry coke are being made, but the market is not very active. Quotations remain at a minimum of $2.75@3 for prompt, with contract coke firm at $3.25@3.50 per ton.

The *Courier* reports the production in the Connellsville and lower Connellsville regions in the week ending Oct. 23 at 442,326 tons, a gain of 15,000 tons over the previous week; and shipments at 5162 cars to Pittsburg, 8513 cars to points west of Pittsburg and 908 cars to points east of Connellsville, a total of 14,583 cars, a gain of nearly 800 cars over the preceding week.

St. Louis

Nov. 1—The continued warm weather this week has resulted in a slight weakening in demand for low-grade coals. The price as yet has not been affected, as prospects are that coal will be on the jump again next week, as a cold wave is in sight. The demand from the country has been good. The demand for 6-in. lump is strong and the lower-grade mines are having a little difficulty in disposing of their egg. In fact, it is so difficult to dispose of low-grade egg that a number of mines have been forced to stop making it altogether and are now only offering 3-in. lump. Screenings are still as low as ever with no prospect of a raise. Standard screenings are being given away for freight and Carterville screenings are going for about 25c. per ton f.o.b. mine. Steam nut coal is also slow and being offered at ridicuously low prices.

The car supply throughout southern Illinois is very bad and seems to be getting worse. A number of mines did not even get in three days' work last week. On this account high-grade coal is very scarce and high. A touch of real cold weather would swamp all of these mines with orders. The central Illinois field seems to have a fair supply of cars, which is undoubtedly due to their having such a short haul to the market.

Carterville 6-in. lump or egg is bringing $1.75 at mine, or $2.42 St. Louis. No. 1 nut has advanced 25c., bringing $1.50 at mine, or $2.17 St. Louis. Screenings are 25@30c. at mine, 92@97c. St. Louis. Franklin county 6-in. lump and egg is strong at $1.90 at mine, or $2.57 St. Louis; 3-in. nut is worth $1.55 at mine, or $2.22 St. Louis. Coal on the Burlington road is worth a premium.

Staunton, Mt. Olive or Springfield district 6-in. lump is $1.50 per ton at mine, or $2.02 St. Louis; 3-in. lump $1.25, or $1.77 St. Louis; nut is 85c., or $1.37 St. Louis.

Standard 6-in. lump is $1.20 mine, or $1.72 St. Louis; 2-in. lump, $1 mine, or $1.52 St. Louis. Screenings from nothing to 5c. per ton mine, or 57c. St. Louis. Steam nut coal has been offered as low as 35c. mine, or 87c. St. Louis. Carterville No. 1 washed is $1.75 mine, or $2.32 St. Louis.

Anthracite is strong and chestnut is exceedingly scarce. A premium over circular could readily be obtained for spot chestnut coal.

Scranton

Nov. 2—Practically all the mines throughout the anthracite regions are now working on full time. There are a few mines here and there idle, but this is due to repairs or improvements in progress. Local superintendents say that orders for anthracite coal are pouring in upon them with unprecedented rapidity and magnitude for this season. The stocks accumulated by the companies last spring have been used up, and wholesale dealers have permitted their reserves to fall so low that they cannot be considered. The mines generally are in first-class condition; the miners are contented, so far as their working conditions go. What with the revival of trade and the anticipation of a normal winter succeeding two unprecedently mild ones, the industrial outlook from one end of the anthracite regions to the other is exceptionally promising just now.

Foreign Coal Trade

Belgian Coal Trade—Imports and exports of fuel in Belgium, nine months ended Sept. 30, metric tons:

	Imports.	Exports.	Excess.
Coal	4,293,642	3,803,615	Imp. 490,027
Coke	225,006	748,464	Exp. 523,458
Briquets	105,319	416,416	Exp. 311,097
Total	4,623,967	4,968,495	Exp. 344,528
Total, 1908	4,342,520	4,486,735	Exp. 144,215

Increase in total imports, 281,447 tons, or 6.5 per cent.; increase in exports, 481,760 tons, or 10.7 per cent.

Railroad Coal in Russia—The Russian Imperial Railway administration recently contracted with coal companies in the Donetz basin for 138,000,000 poods—about 2,500,000 tons—of coal, deliveries to run over three years. The contract prices range from 7.25 to 8.25 kopeks per pood—$2.07 to $2.35 per short ton, f.o.b. cars.

Welsh Coal Market—Messrs. Hull, Blyth & Co., London and Cardiff, Wales, report prices of coal as follows on Oct. 23: Best Welsh steam, $4.14; seconds, $3.90; thirds, $3.72; dry coals, $4.02; best Monmouthshire, $3.48; seconds, $3.36; best small steam, $2.16; seconds, $1.68. All prices are per long ton, f.o.b. shipping port, for cash in 30 days, less 2½ per cent. discount.

Iron Trade Review

New York, Nov. 3—The iron and steel market activities continue with little variation. Business is active and there is special animation in certain lines which promises to keep up during the coming month.

In pig iron considerable purchases of bessemer from merchant furnaces by several steel companies are reported in the Central West. In the East foundry iron is still being taken and prices remain firm and even higher, $19.75 having been asked for No. 1 foundry, New York delivery. More basic iron is being taken and the prospects are for a steady demand for that kind of pig.

The call for billets and other semi-finished material is very good. In fact, steel billets are scarce, and it is understood that some negotiations are in progress looking to the importation of a considerable quantity of basic billets from Germany.

In finished material there is quite an excitement in plates, the large demand being due to the recent placing of extraordinary orders for steel cars by a number of railroads. Other material is quiet and structural steel is almost dull in comparison with what it has been.

The American Sheet and Tin Plate Company has closed down two of its large tin plants at Bridgeport, O., and Martin's Ferry, O., and is moving the machinery to other points. These two were the largest union plants of the company, and were those chiefly affected by the Amalgamated Association strike.

Foreign Iron Ores—It is stated that furnaces in eastern Pennsylvania have recently placed orders for about 300,000 tons of Swedish iron ore from the Kirunavaara mines for 1910 delivery. The price at which these ores were offered was 8½c. per unit ex-ship, Philadelphia, which would be $4.25 per ton for a 50 per cent. ore.

Baltimore

Nov. 2—Imports for the week included 175 tons spiegeleisen and 2606 tons fer-

romanganese from Great Britain; 635 tons manganese ore from Beira; 10,750 tons iron ore from Cuba.

Birmingham

Nov. 1—Firm at $15 per ton, No. 2 foundry, is the Southern pig-iron market. The selling has been halted a little lately, though inquiries continue to come in. What selling that is being done in this part of the country is for the first half of the coming year. Reported imports of foreign pig have had the effect of stopping to a certain extent much of the inclination toward a runaway market. The home consumption continues to show improvement and the shipments are equal to the make and a little better. The probable make for the first quarter of the coming year has been covered. Charcoal iron has become very active recently, the buying on the part of car-wheel makers of a couple of months back, now being followed by railroad interests and others. The price of charcoal iron is inclined upward, $21.50 being the regular quotations.

Chicago

Nov. 2—The iron market continues quiet, with sales of pig iron widely distributed but in small lots generally. Sales hold in general to $15 Birmingham ($19.35 Chicago) for Southern and $19@19.50 for Northern No. 2, on iron for delivery in the next three months. Most sales are for first-quarter delivery, with some scattering trade remaining on 1909 deliveries and a gradual extension into the second quarter by melters who have held out as long as possible to see how things would go. The lull in buying is simply that the melters have at last caught up to the immediately prospective needs of their customers.

Sales of iron and steel products are in general quiet but of good aggregate volume, with railroad supplies most in demand. Coke is selling at $5.10@5.25—an advance of 25c. or more—because of the short supply.

Cleveland

Nov. 2—The iron-ore situation is unchanged. The movement is so heavy that there is trouble in handling at the docks. There is a rush to get down as much as possible before navigation closes.

Pig Iron—New sales are fewer, but the market is firm, and no concessions are to be had. Quotations are for bessemer, $19@19.50; No. 2 foundry, $18.25@18.50; gray forge $17.25@17.50; Lake Superior charcoal, $20; all Cleveland delivery.

Finished Material—Less is heard of new contracts, but specifications are coming with a rush. The only line showing many new orders is bar iron.

Philadelphia

Nov. 3—The explanation of the moderate amount of business done in pig iron this week is that the furnaces are well sold up, buyers are pretty well supplied for the present and makers are unwilling to compromise themselves by entering into contracts for late deliveries when they can see no particular necessity for it. There are concerns here which would like to have more iron and one contract for 3000 tons of bessemer was put through for what is regarded as early delivery at $19. A great deal more basic iron will be needed in this territory and the manufacturers are solicitous, but for the present must rest assured with promises that they will be taken care of. Further sales of malleable have been made and forge contracts have been placed. More interest has been taken in Virginia and Alabama iron than usual. Both Northern and Southern No. 2 are quoted strong at $19, and forge is $17.50@18.

Steel Billets—Both bessemer and open-hearth billets have advanced another 50c. and there are still hanging in the balance a few orders which hinge on delivery. Forging billets are urgently wanted for early delivery.

Scrap—Scrap dealers report everything salable as sold up and urgent inquiries crowding in for larger supplies for the winter. Heavy steel scrap is practically exhausted and the holders of railroad scrap are not selling or accepting offers.

Pittsburg

Nov. 2—The iron and steel situation continues strong on account of heavy pressure on the mills all along the line for deliveries. Specifications are still coming in on old contracts for finished products, while buyers are urging better deliveries on specifications already filed. While the general feeling has been that some important part of the finished steel currently shipped is going into stocks of manufacturers and jobbers, it is certain from the pressure exerted on mills that a very large part is required for current consumption. The pressure for steel-bar deliveries to the agricultural trade is particularly strong. Some of the mills report steel-bar specifications actually on books sufficient for full production over from four to five months.

The general tendency of the mills is to discourage new buying, as they think they see evidences of a speculative tendency. Orders are accepted only after careful scrutiny, and in many cases the tonnages offered are scaled down.

Pig Iron—The Youngstown Sheet and Tube Company has bought 40,000 tons of bessemer pig at $19, Valley, taking 30,000 tons from the Bessemer Pig Iron Association for delivery November to June, inclusive, and 10,000 tons from W. P. Snyder & Co., for November and December. A sale of 3000 tons of prompt bessemer has been made to an eastern steel interest at $19, Valley, and a local merchant furnace interest has bought a total of 5000 tons, paying $19 for the major part, but paying $19.10 for two 1000-ton lots. The Massillon Iron and Steel Company has bought 36,000 tons of Nos. 3 and 4 foundry iron, for delivery over the first half, at $17, Valley, for No. 3 and a shade less for No. 4. Outside of this business the pig-iron market has been quiet. The bessemer average for October was $18.78, Valley, sales of 165,000 tons being recorded, while the basic average was $16.94, Valley. These represent advances over September of $1.34 on bessemer and $1.04 on basic. The market remains quotable as follows, Valley furnace: Bessemer, $19; basic, $17.25@17.50; foundry, $17.25@17.75; malleable, $17.50@18; gray forge, $16.25@16.75 per ton.

Steel—The scarcity of steel has become still more acute, there being scarcely any available for this year, while producers are not naming for next year. Nominally bessemer billets are about $27 at mill, Pittsburg, with open-hearth billets at $28, sheet-bars at $28 and rods at $32 per ton.

Sheets—The market is strong and mills are conservative as to sales for next year, while they are practically sold up for this year. Regular prices remain at 2.30c. for black and 3.35c. for galvanized, 28 gage, corrugated roofing being $1.60 a square for painted and $2.85 for galvanized.

St. Louis

Nov. 1—The demand for pig iron still continues heavy and buyers are snapping up everything that is being offered for the first quarter of next year, which is very little. Business for the first half is active and furnaces are very nearly sold out for that period. The market is the same as it has been, $15@15.25 per ton. Birmingham or $18.75@19 St. Louis for No. 2 foundry.

Metal Markets

New York, Nov. 3—More activity has been displayed in the metal markets, and there seems to be more buying interest in copper developing.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
Sept. 1909..	$ 7,546,442	$ 2,350,958	Exp. $ 5,195,484
" 1908..	3,974,391	4,767,051	Imp. 792,660
Year 1909..	97,272,834	31,105,193	Exp. 66,167,641
" 1908..	68,937,380	38,427,973	" 30,509,407
Silver:			
Sept. 1909..	4,385,532	3,261,397	Exp. 1,124,135
" 1908..	4,198,286	3,370,591	" 827,695
Year 1909..	43,289,116	33,240,530	" 10,048,586
" 1908..	38,781,380	30,792,704	" 7,988,676

Exports from the port of New York, week ended Oct. 30: Gold, $1,640 000, to Brazil, Panama and Haiti; silver, $540,004, to London and Paris. Imports: Gold, $107,737; silver, $236,215, from the West Indies, Mexico and South America.

A Johannesburg telegram estimates the October production of gold in the Transvaal at 600,000 oz., or $12,400,000; making a total of $125,576,000 for the 10 months ending with October.

Gold—There was a demand for gold on the open market in London, and prices remained at 77s. 11¼d. per oz. for bars, and 76s. 5¼d. for American coin. Paris and Berlin took some of the gold arriving, a good share going to the Bank of England. In New York some more gold was taken for South America.

Platinum—The market continues very strong, demand being good, especially for the jewelry trade. Dealers ask $28.50 per oz. for refined platinum, and $32.25 for hard metal.

Silver—The market continues steady without any special feature. Demand the last few days appears to be from China, and the market has been sustained by purchases on account of that country rather than by orders from India, where the price equivalent for the moment is somewhat lower.

SILVER AND STERLING EXCHANGE

Oct.-Nov.	28	29	30	1	2	3
New York....	50⅝	50¼	50	50¼	.....	50⅜
London.....	23 5/16	23⅛	23 1/16	23⅛	23¼	23 3/16
Sterling Ex..	4.8720	4.8720	4.8725	4.8730	.....	4.8725

New York quotations, cents per ounce troy, fine silver; London, pence per ounce sterling silver, 0.925 fine.

Exports of silver from London to the East, Jan. 1 to Oct. 21, as reported by Messrs. Pixley & Abell:

	1908.	1909.	Changes.
India.....	£ 7,477,463	£5,168,600	D. £2,308,863
China.....	516,400	1,555,200	I. 1,038,800
Straits.....	112,385	82,800	D. 29,585
Total.....	£ 8,106,248	£6,806,600	D. £1,299,648

Copper, Tin, Lead and Zinc

Oct.-Nov.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. New York, Cts. per lb.	Lead. St. Louis, Cts. per lb.	Zinc. St. Louis, Cts. per lb.
28	12⅞ @13⅛	12½ @12¾	57	30½	4.32½ @4.37½	4.20 @4.25	6.22½ @6.27½
29	12⅞ @13⅛	12⅝ @12¾	57⅝	30½	4.32½ @4.37½	4.20 @4.25	6.22½ @6.27½
30	12⅞ @13⅛	12⅝ @12¾	....	30¾	4.32½ @4.37½	4.20 @4.25	6.22½ @6.27½
1	12⅞ @13⅛	12⅝ @12⅞	57¼	30⅝	4.35 @4.37½	4.22½ @4.27½	6.22½ @6.27½
2	.....	.....	....	....	.....	4.22½ @4.27½	6.22½ @6.27½
3	12⅞ @13⅛	12⅝ @12⅞	57¾	30½	4.35 @4.37½	4.22½ @4.27½	6.22½ @6.27½

London quotations are per long ton (2240 lb.) standard copper. The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis, New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—The air has been full of rumors regarding the plans pending to better the condition of the copper industry, either by amalgamation of leading producers or curtailment of production. It is recognized generally that the present offers exceptional opportunity for carrying out a scheme of this kind, but there has been no tangible evidence of such an undertaking excepting in a violent advance of copper shares, particularly those of the Amalgamated Copper Company. However, these developments have brought home to consumers that irrespective of everything else the present price of copper is low, and a buying movement of considerable proportions took place during the week, both here and in Europe, which resulted in a stiffening of prices. At the close the market is firm at 12⅞@13⅛c. for Lake copper, and 12¾@12⅞c. for electrolytic copper in cakes, wirebars and ingots. Casting copper is quoted nominally at 12½@12¾ cents.

Copper sheets are 17@18c., base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 14½c. base, carload lots at mill. Business continues on a good scale.

The standard market in London has in even a greater degree been affected by the aforesaid speculative possibilities, and the close is firm and higher at £57 15s. for spot and £58 17s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £62; best selected, £61@62; strong sheets, £73@74 per ton.

Exports of copper for the week from New York and Philadelphia were 4968 long tons. Our special correspondent gives the exports from Baltimore at 1392 tons of copper.

Copper in October—During October the copper market was quite uninteresting, there having been no large buying movement at any time. The chief feature of the month was the rise in the rate for money which compelled some speculators to liquidate, while moreover some of the foreign bankers sought to discourage the speculation in copper. These factors resulted in the disadvantageous marketing of a good deal of copper. The statistics published on the tenth of the month contributed to the unfavorable sentiment. During the month one of the large sellers remained practically out of the market, but others freely took such business as was offered upon a declining scale, the price for electrolytic toward the close of the month sagging nearly to 12½c. At the very end there was a slight improvement in tone. During the month the business of American manufacturers was excellent in all branches with the exception of heavy wire for transmission and trolley purposes. On the other hand, business in the brass and sheet trades was extremely active and the mills at Waterbury were reported as working overtime.

Tin—The publishing of the domestic statistics, which showed almost record deliveries for the month of October, brought about active business in this market toward the end of last week. The London market, however, did not readily respond to the advance in the domestic market, but showed rather an easier tendency. The market over there closes at £138 2s. 6d. for spot, and £140 2s. 6d. for futures, while tin in this market can be secured at about 30½ cents.

Lead—The demand for this metal is broadening, and prices are again somewhat firmer at 4.35@4.37½c. New York, and 4.22½@4.27½c. St. Louis.

The London market is easier, and the close is cabled at £13 for Spanish, and £13 2s. 6d. for English lead.

Spelter—Consumers having supplied their requirements, the demand has considerably decreased, but as smelters are liberally supplied with orders, prices have remained steady at 6.22½@6.27½c. St. Louis, and 6⅜@6.42½c. New York.

New York quotations for spelter, Oct. 28 to 30, inclusive, were 6.37½@6.42½c.; Nov. 1 and 3, also, 6.37½@6.42½ cents.

Up to Oct. 30, inclusive, there were some very large sales of spelter on the basis of 6.25c. St. Louis. Since then the transactions have been small, and sentiment as to the market seems to be mixed, some sellers considering the tone to be a little stronger while others regard it as a little weaker. Evidently the market is near the top of the recent rise, if the top has not already been passed.

The London market is unchanged at £23 2s. 6d. for good ordinaries, and £23 7s. 6d. for specials.

Base price of sheet zinc is now 8c. per lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Other Metals

Antimony—Business is good, but prices are unchanged. Cookson's is quoted at 8⅜@8½c. per lb.; Hallett's, 8¼@8⅜c.; U. S., 7⅞@8c.; outside brands, 7⅝@7¾c. per pound.

Aluminum—No change is noted. No. 1 ingots are still quoted 20@23c. per lb. in large lots, the higher figure being that named by the American maker.

Quicksilver—Business has been active, and there has been a further sharp advance. In New York the quotation is now $50@51 per flask of 75 lb. for large lots, while jobbers ask 68@70c. per lb. for small orders. San Francisco quotations are $48.50 per flask for domestic business and $2 less for export. The London price has also been sharply advanced, and is now £9 per flask, with £8 17s. 6d. asked by jobbers.

Magnesium—The price of pure metal is $1.50 per lb. for 100-lb. lots f.o.b. New York.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot, from 50c. for 2000-lb. lots, up to 55c. for 500-lb. lots. The price for electrolytic is 5c. higher.

Cadmium—Current quotations, 65@70c. per lb. in 100-lb. lots at Cleveland, Ohio. In Germany 450@475 marks per 100 kg., at factory in Silesia.

Spanish Metal Exports

Exports of metals and minerals from Spain, eight months ended Aug. 31.; reported by *Revisa Minera*, in metric tons:

Metals.	1908.	1909.	Changes.
Pig and manuf. iron	23,977	40,320	I. 16,343
Copper	8,600	12,569	I. 3,969
Copper precipitate	14,568	11,193	D. 3,375
Lead	124,329	121,071	D. 3,258
Zinc	815	883	I. 68
Quicksilver	1,495	1,488	D. 7
Minerals.			
Iron ore	5,216,901	5,170,256	D. 46,645
Manganese ore	16,105	9,612	D. 6,493
Copper ore	794,499	752,517	D. 41,982
Lead ore	2,269	2,461	I. 192
Zinc ore	73,529	84,402	I. 10,873
Pyrites	975,828	888,251	D. 87,577
Salt	431,527	418,780	D. 12,747

Imports of phosphate rock, 62,396 tons in 1908, and 57,400 in 1909; decrease, 4996 tons.

Zinc and Lead Ore Markets

Platteville, Wis., Oct. 30—The highest price paid this week for zinc ore was $51 per ton; the base price, 60 per cent. zinc, was $50 per ton. The base price paid for lead ore was $55@56 per ton.

SHIPMENTS, WEEK ENDED OCT. 30.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville	673,220	79,390	328,950
Benton	697,780	.....	126,000
Hazel Green	490,800	.....	53,800
Highland	429,900	75,000	.....
Cuba City	402,160	.....	108,100
Galena	400,000	.....	.....
Days Siding	160,000	.....	.....
Rewey	150,600	.....	.....
Livingston	140,000	.....	.....
Linden	126,290	.....	59,330
Harker	111,180	110,900	.....
Shullsburg	88,000	88,000	.....
Montfort	66,000	.....	.....
Total	3,935,930	353,290	676,180
Year to Oct. 30	115,727,135	7,766,185	12,078,910

In addition to the above there was shipped to the American Zinc Ore Separating Company, 260,770 lb. and to the Joplin Separator Works, 370,575 lb. zinc ore.

Joplin, Mo., Oct. 30—The highest price paid for zinc-sulphide ore was $54 per ton, the base being $50@52.50 per ton of 60 per cent. zinc, for the choicest grades, and as high as $53 base for several bins of ore heavy in iron. Zinc-silicate ore sold up to $32.50, the base ranging from $27.50 to $28.50 per ton of 40 per cent. zinc. Average price, all grades $48.14 per ton. There was no advance in the general lead market, yet a few large bins of ore were advanced to $58, with the general market at $57 per ton, and medium grades selling at $55@56. Average price, all grades $55.82 per ton.

The continued cry for cars on the part of the purchasing agents brought an extra supply this week, and the largest zinc shipment ever known in one week was the outcome. There were over 8100 tons shipped. This will materially relieve the reserve stock, leaving unsold approximately 3500 tons, and reducing the bin stock to 6500 tons.

SHIPMENTS, WEEK ENDED OCT. 30.

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	5,648,780	1,566,540	$185,083
Joplin	2,293,390	233,370	64,627
Miami	1,098,600	420,670	37,045
Duenweg	946,390	161,820	26,758
Prosperity	684,820	322,680	26,154
Galena	786,350	95,930	21,588
Aurora	658,850	.....	13,375
Granby	633,320	9,570	11,680
Oronogo	472,110	.....	11,429
Jackson	465,750	.....	11,178
Alba-Neck	394,170	8,590	10,085
Spurgeon	354,840	81,390	9,712
Zincite	308,530	.....	8,021
Badger	271,970	.....	6,544
Carthage	261,740	6,400	6,716
Quapaw	244,570	.....	5,869
Sarcoxie	158,840	.....	5,186
Saginaw	174,010	3,080	3,970
Cave Springs	125,280	.....	3,068
Carl Junction	66,140	.....	1,752
Wentworth	65,540	.....	1,506
Stott City	54,040	.....	1,351
Totals	16,277,030	2,899,940	$472,917
10 months	499,294,380	75,302,080	$12,004,040

Zinc value, the week, $391,955; 10 mos., $9,948,294
Lead value, the week, 80,962; 10 mos., 2,055,746

MONTHLY AVERAGE PRICES.

Month.	Zinc Ore. Base Price.		Zinc Ore. All Ores.		Lead Ore. All Ores.	
	1908.	1909.	1908.	1909.	1908.	1909.
January	$37.60	$41.25	$35.56	$38.46	$46.88	$52.17
February	36.63	36.94	34.92	34.37	49.72	50.50
March	36.19	37.40	34.19	34.71	49.90	50.82
April	35.40	38.63	34.08	37.01	52.47	55.63
May	34.19	40.06	33.39	37.42	56.05	56.59
June	33.06	44.15	32.07	40.35	60.48	57.52
July	34.55	43.06	31.67	41.11	59.90	53.74
August	36.53	48.25	33.42	44.54	60.34	57.60
September	37.63	47.70	34.44	44.87	54.59	56.11
October	35.95	49.50	33.28	45.75	52.63	55.02
November	39.13	.....	35.02	.....	54.53	.....
December	42.75	.....	39.63	.....	49.68	.....
Year	$36.63	.....	$34.31	.....	$53.93	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

Chemicals

New York, Nov. 3—The general market continues to show some degree of improvement. Contract deliveries continue good and there is a little more spot business in some lines.

Copper Sulphate—There is not much change in the volume of business, but the market is steady. Quotations are unchanged at $3.95 per 100 lb. for carload lots and $4.25 per 100 lb. for smaller orders.

Arsenic—Trade remains quiet and in the absence of large transactions prices are unchanged. White arsenic is quoted at 2.70@2.75c. for spot and 2.87½c. for next year's delivery.

Nitrate of Soda—The market this week has been quiet, with only small transactions. Supplies are good and quotations continue at 2.10c. per lb. for both spot and future positions.

Mining Stocks

New York, Nov. 3—Election day and the various activities preceding and following it interfered with the Stock Exchange in New York perhaps a little more than the actual holiday would seem to warrant. In the early part of the week there was a degree of firmness displayed, with some advance in stocks; but later this gain was dissipated and the market weakened slightly. Money continues rather high and this has discouraged speculation. Moreover there was less buying of securities from abroad, the 5 per cent. rate in London and high rates in Berlin weighing somewhat heavily on speculators over there.

On the Curb copper stocks were rather firmer in the early part of the week, and there was considerable dealing, the rumors of some arrangement pending among the copper producers having helped that class of stocks. Dealings in the Cobalt stocks were rather large, but were accompanied with some weakness. The Nevada gold stocks were not especially active.

There was one sale of Homestake of South Dakota during the week, 154 shares changing hands at $88 per share.

Boston, Nov. 2—Copper shares had quite a sharp rise late last week on reports of a combination of some sort. The persistent advance in the price of Amalgamated from $80.50 to $87.12½ in less than a week, lends strength to this assertion, while the technical denial of President Ryan, of the Amalgamated Company, does not carry much weight. Local interests believe that the long delayed copper-stock boom is not far distant now.

Sympathetically North Butte had a sharp rise of $4.37½ to $60.87½, although there is considerable bearish talk on it from Lawson quarters. Butte Coalition has been active and strong with a $1.75 advance to $28.50. The resumption of dividends at this time would indicate that something unusual was happening.

Calumet & Hecla felt the effect of bullish sentiment and rose $30 to $670, while Calumet & Arizona rose to $7 to $104, although the latter reacted to $100 on free profit taking. Bonanza mining had a spurt to 80c. on knowledge that the company had disposed of land which would admit of a small dividend. Copper Range also

benefited to the extent of $2.75 by touching $81.25. American Zinc made its high for the year at $37. Lake rose $3 to $37.25, but the market for this stock is less aggressive.

Curb trading has been active and many of the stocks have recorded good advances. Union Copper and Consolidated Arizona have been favorites.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
I	112,135,200	51,862,624	38,499,797
II	103,700,817	43,578,118	30,968,496
III	117,058,661	48,871,964	59,191,043
IV	113,574,292	47,546,010	65,110,111
V	118,356,146	61,163,325	70,542,753
VI	116,567,493	60,591,116	70,966,457
VII	118,277,603	75,520,083	75,018,974
VIII	120,597,234	59,614,207	48,382,704
IX	118,023,139	52,105,955	50,077,777
X			
XI			
XII			

VISIBLE STOCKS.

	United States.	Europe.	Total.
I	122,357,266	124,716,480	247,073,746
II	144,130,045	118,574,400	262,704,445
III	173,284,248	117,140,800	290,425,048
IV	182,279,902	115,024,000	297,303,902
V	183,198,073	114,050,320	297,248,393
VI	169,848,141	127,352,960	297,201,101
VII	154,858,061	150,928,960	305,787,021
VIII	122,596,607	171,492,160	294,088,767
IX	135,196,930	197,993,600	333,190,530
X	151,037,137	210,224,000	361,261,137
XI		222,566,400	
XII			

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month.

Monthly Average Prices of Metals

SILVER

Month.	New York.		London.	
	1908.	1909.	1908.	1909.
January	55.678	51.750	25.738	23.834
February	56.000	51.472	25.855	23.706
March	55.365	50.468	25.570	23.227
April	55.505	51.428	25.133	23.708
May	52.795	52.905	24.377	24.343
June	53.663	52.538	24.760	24.166
July	53.115	51.043	24.514	23.519
August	51.683	51.125	23.858	23.588
September	51.720	51.440	23.877	23.743
October	51.431	50.913	23.725	23.502
November	49.647		22.933	
December	48.766		22.493	
Total	52.864		24.402	

New York, cents per fine ounce; London, pence per standard ounce.

COPPER

	NEW YORK.				LONDON.	
	Electrolytic		Lake.			
	1908.	1909.	1908.	1909.	1908.	1909.
January	13.726	13.893	13.901	14.280	62.386	57.688
February	12.905	12.949	13.098	13.295	58.786	61.198
March	12.704	12.387	12.875	12.826	58.761	56.231
April	12.743	12.56¼	12.928	12.93¾	58.331	57.363
May	12.598	12.893	12.788	13.238	57.387	59.338
June	12.675	13.214	12.877	13.548	57.842	59.627
July	12.702	12.880	12.933	13.363	57.989	58.556
August	13.462	13.007	13.639	13.296	60.500	59.393
September	13.388	12.870	13.600	13.210	60.338	59.021
October	13.354	12.700	13.646	13.030	60.139	57.551
November	14.130		14.386		63.417	
December	14.111		14.411		62.943	
Year	13.208		13.424		59.902	

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

Month.	1908.	1909.	Month.	1908.	1909.
January	27.380	28.060	July	29.207	29.125
February	28.978	28.290	August	29.942	29.966
March	30.577	28.727	September	28.815	30.293
April	31.702	29.445	October	29.444	30.475
May	30.015	29.225	November	30.348	
June	28.024	29 322	December	29.154	
			Av. year	29.465	

Prices are in cents per pound.

LEAD

Month.	New York.		St. Louis	London.	
	1909.	1909.	1909.	1908.	1909.
January	3.691	4.175	4.025	14.469	13.113
February	3.725	4.018	3.868	14.250	13.313
March	3.838	3.986	3.835	13.975	13.438
April	3.993	4.168	4.051	13.469	13.297
May	4.253	4.287	4 214	12.938	13.225
June	4.466	4.350	4 291	12.600	13.031
July	4.744	4.321	4.188	13.000	12.563
August	4.580	4.363	4.227	13.375	12.475
September	4.515	4.342	4.215	13.125	12.781
October	4.351	4.341	4.215	13.375	13.175
November	4.330			13.538	
December	4.213			13.156	
Year	4.200			13.439	

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York.		St. Louis.		London.	
	1908.	1909.	1908.	1909.	1908.	1909.
January	4.513	5.141	4.363	4.991	20.563	21.425
February	4.788	4.889	4.638	4.739	20.875	21.563
March	4.665	4.757	4.527	4.607	21.075	21.438
April	4.645	4.965	4.495	4.815	21.344	21.531
May	4.608	5.124	4.458	4.974	19.906	21.975
June	4.543	5.402	4.393	5.252	19.000	22.000
July	4.485	5.402	4.338	5.252	19.031	21.969
August	4.702	5.729	4.556	5.579	19.350	22.125
September	4.769	5.796	4.619	5.646	19.563	22.906
October	4.801	6.199	4.651	6.043	19.750	23.200
November	5.059		4.909		20.875	
December	5.137		4.987		20.625	
Year	4.726		4.578		20.163	

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

STOCK QUOTATIONS

NEW YORK	Nov. 3	BOSTON	Nov. 3
Name of Comp.	Clg.	Name of Comp.	Clg.
Alaska Mine	‡.11	Adventure	4⅞
Amalgamated	‡80¾	Allouez	58½
Anaconda	‡45¾	Am. Zinc	‡34⅜
Balakiala	‡2 1/16	Arcadian	4¼
British Col. Cop.	7	Arizona Com.	45¼
Buffalo Mines	3½	Atlantic	11
Butte Coalition	28⅞	Boston Con	14
Colonial Silver	‡⅛	Calumet & Ariz.	101
Cum. Ely Mining	7⅜	Calumet & Hecla	665
Davis-Daly	5 1/16	Centennial	39
Dominion Cop.	7	Copper Range	81
Douglas Copper	1⅜	Daly-West	7⅜
El Rayo	2½	East Butte	11
Florence	2⅞	Franklin	16½
Foster Cobalt	‡.32	Greene—Can.	11¼
Furnace Creek	‡.05	Hancock	11
Giroux	9¾	Isle Royal	25½
Gold Hill	½	Keweenaw	2⅜
Goldfield Con.	7 1/16	La Salle	14½
Granby	‡95	Mass	6
Greene Gold	‡⅛	Michigan	6
Greene G. & S.	‡9	Mohawk	60
Guanajuato	2⅜	Nevada	25
Guggen. Exp.	215	North Butte	59½
Hanapah	‡15	Ojibway	6¾
Kerr Lake	8¾	Old Colony	.50
McKinley-Dar.	.85	Old Dominion	52½
Miami Copper	16¼	Osceola	157
Micmac	3/16	Parrot	29½
Mines Co. of Am.	⅛	Quincy	87½
Montezu. of C. R.	19	Rhode Island	‡4¾
Mont. Sho. C.	1	Shannon	16
Nev. Utah M. & S.	1⅜	Superior	58½
Newhouse M. & S.	2½	Superior & Bost.	14
Nipissing Mines	11¾	Superior & Pitts.	16½
Old Hundred	⅛	Tamarack	65
Silver Queen	.34	Trinity	10
Stewart	7/16	U. S. Smg. & Ref.	55
Tennessee Cop'r.	33½	U.S.Sm. & Re., pd.	52½
Tri-Bullion	1½	Utah Con.	44
United Copper	8⅞	Victoria	3¼
Utah Apex	4⅛	Winona	7
Utah Copper	46	Wolverine	150
Yukon Gold	4 1/16	Wyandotte	2½

‡Last quotation. ‡Last quotation.

N. Y. INDUSTRIAL

Am. Agri. Chem.	46
Am. Smelt. & Ref.	98⅜
Am.Sm. & Ref., pf.	111
Colo. Fuel & Iron.	46⅜
Federal M. & S., pf.	‡80
National Lead	88¾
National Lead, pf.	‡110⅛
Pittsburg Coal	21⅞
Republic I. & S.	47⅜
Republic I. & S., pf.	106⅜
Sloss-Sheffield	92
Standard Oil	‡685
U. S. Steel	90⅛
U. S. Steel, pf.	128
Va. Car. Chem.	47

BOSTON CURB

	Low.
Ahmeek	210
Chemung	16½
Chino	7½
Gila	7⅛
Indiana	6¾
Mason Valley	17⅛
Ray Central	2 1/16
Ray Con.	19
San Antonio	8⅛
Yuma	1½

Furnished by Hornblower & Weeks, N. Y.

ST. LOUIS Oct. 30

N. of Com.	High.	Low.
Adams	.40	.30
Am. Nettie.	.09	.07
Center Cr'k	1.80	1.60
Cent. C. & C.	86 00	85.00
C.C. & C. pf.	85.00	83.00
Cent. Oil	110.00	100.00
Columbia	9.00	7.00
Con. Coal	18.00	17 00
Doe Run	120.00	110.00
Gra. Bimet.	.25	.20
St. Joe	12.50	11.00

LONDON Nov. 3

Name of Com.	Clg.
Dolores	£1 10s 0d
Stratton's Ind.	0 3 3
Camp Bird	1 9 0
Esperanza	3 0 0
Tomboy	1 0 19 6
El Oro	1 6 0
Oroville	0 11 9

Cabled through Wm. P. Bonbright & Co., N. Y.

NEVADA STOCKS. Nov. 3.

Furnished by Weir Bros. & Co., New York.

Name of Comp.	Bid.	Name of Comp.	Bid.
COMSTOCK STOCKS		Silver Pick	.09
Belcher	1 00	St. Ives	65
Best & Belcher	.60	Triangle	01
Caledonia	.27	BULLFROG STOCKS	
Chollar	.16	Gibraltar	02
Comstock	‡.33	Homestake King.	‡ 01
Con. Cal. & Va.	1.05	Mont. Shoshone C.	1 06
Crown Point	‡1.15	Tramp Cons.	04
Exchequer	‡ 43	MISCELLANEOUS	
Gould & Curry	.30	Cumberland Ely.	7.62½
Hale & Norcross	.41	Giroux	9.62½
Mexican	1.27	Greenwa'r Copper	09
Ophir	1.67	Nevada Con.	25.25
Overman	.26	Nevada Hills	.60
Potosi	.40	Nevada Smelting.	.75
Savage	.39	Nevada Wonder	50
Sierra Nevada	.45	Nevada-Utah	1 25
Union	.66	Penn-Wyoming	...
Utah	.08	Pittsburgh S. Pk.	60
Yellow Jacket	1 00	Ray Central	2.56¼
TONOPAH STOCKS		Ray Con.	18.62½
Belmont	.70	Round Mt. Sphinx	.05
Extension	.47		
Golden Anchor	...		
Jim Butler	.11		
MacNamara	.24		
Midway	.15		
Montana	.82		
North Star	.02		
Tono'h Mine of N.	6.62½		
West End Con	.22		
GOLDFI'D STOCKS			
Adams	.01		
Atlanta	.11		
Blue Bell	.02		
Booth	.10		
C.O.D. Con	.06		
Columbia Mt.	.06		
Comb. Frac.	.60		
Cracker Jack	.01		
Dia'dfield B. B. C.	.01		
Florence	2.62½		
Goldfield Belmont	.04		
Goldfield Daisy	.06		
Great Bend	.04		
Jumbo Extension	.13		
Kendall	.02		
Lone Star	.02		
May Queen	.04		
Oro	.03		
Red Hill	.03		
Sandstorm	.04		

COLO. SPRINGS Oct. 29

Name of Comp.	Clg.
Acacia	.07⅛
C. C. Con	.03
Doctor	.08
Elkton	.72
El Paso	.59
Findlay	.10½
Gold Dollar	.14
Gold Sovereign	.04
Isabella	.17½
Jack Pot	‡.08½
Jennie Sample	.07¾
Jerry Johnson	.06⅞
Lexington	‡.01¾
Mary McKinney	.47
Old Gold	‡.04
Pharmacist	.03½
Portland	.82
U. G. M.	.08
Vindicator	.67½
Work	.06

Assessments

Company.	Delinq.	Sale.	Amt.
Alpha, Nev	Nov. 11	Dec. 7	$0.05
Belcher, Nev	Nov. 9	Nov. 30	0.10
Caledonia, Nev	Oct. 21	Nov. 11	0.10
Chollar, Nev	Nov. 8	Dec. 1	0.10
Gold Mt., Utah	Sept. 15	Nov. 15	0.0025
Gould & Curry, Nev	Oct. 28	Nov. 17	0.10
Hypothek, Ida	Sept. 30	Dec. 1	0 005
Idaho North Star, Ida	Oct. 23	Nov. 15	0.01
Julia Con., Nev	Oct. 14	Nov. 8	0.03
Missoula Copper, Ida	Oct. 4	Dec. 6	0.01
Overman, Nev	Nov. 9	Nov. 30	0.10
Pawhattan, Ida	Oct. 7	Nov. 8	0.001
Potosi, Nev	Nov. 12	Dec. 6	0.10
San Antonia Copper, Mex.	Dec. 1		1.00
Savage, Nev	Nov. 10	Dec. 1	0.10
Sierra Nevada, Nev	Oct. 12	Nov. 3	0.10
Silver Queen, Utah	Oct. 7	Nov. 15	0.025
United Silver-Lead, Ida	Sept. 21	Nov. 20	0.001
St. Louis, Nev	Oct. 22	Nov. 12	0.01
Utah, Nev	Oct. 26	Nov. 16	0.05
Yellow Jacket, Nev	Nov. 18	Dec. 22	0.10

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

ABRASIVES—

Carbons, good drill quality, carat		$50.00@75.00
Carborundum, f.o.b. Niagara Falls, powd.	lb.	.08
Grains	"	.10@.17
Corundum	"	.07@.10
Crushed Steel, f.o.b. Pittsburg	"	.05¾@.06
Emery, in kegs; Turkish flour	"	.01¾@.02
Grains	"	.03¼@.04
Naxos flour	"	.01¾@.02
Grains	"	.03¼@.04
Chester flour	"	.01¼@.02
Grains	"	.03½@.04
Peekskill flour, f.o.b. Easton, Pa.	"	.01¼@.01¾
Grains, in kegs	"	.02¾@.03
Garnet, per quality	sh. ton.	25.00@35.00
Pumice Stone, Am. Powd.,	100 lb.	1.60@2.00
Italian, powdered	per lb.	.01¾@.01¾
Lump, per quality	"	.05@.30
Rottenstone, ground	"	.02@.04
Lump, per quality	"	.05@.30
Rogue, per quality	"	.05@.30
Steel Emery, f.o.b. Pittsburg	"	.07½@.07¾

ACIDS—

Acetic 28%	lb.	.02½
Boric	"	.07
Hydrofluoric, 30%	"	.02¾@.03¼
" 48%	"	.06
" 52%	"	.06½
" 60%	"	.10
Hydrochloric acid, 20° per 100 lb.		1.15@1.50
Nitric acid, 38°	per lb.	.04¼@.04½
Sulphuric acid, 50°, bulk per ton.		$12 up
60°, 100 lb. in carboys.		.85@1.12½
60°, bulk, ton		16.00@18.00
66°, 100 lb. in carboys.		1.00@1.10
66°, bulk, ton		18.00
Oxalic	per lb.	.07¾@.08

ALCOHOL—Grain 95% gal. 2.61

Denatured	"	.43@.45
Refined wood, 95@97%	"	.52@.57

ALUM—Lump 100 lb. $1.75

Ground	"	1.85
Chrome Alum	"	.03¾@.04½

ALUMINUM—Sulphate, com'l. lb. 1.50@1.75

AMMONIA—24 deg. lb. .04½@.05½

" 26 deg. lb " .04¾@.05¾

AMMONIUM—

Bromide	lb.	.28
Carbonate	"	.07¾@.09½
Muriate grain	"	.05¾@.06½
Lump	"	.09¼@.09½
Sulphate, 100 lb	"	2.60@2.65
Sulpho-cyanide com	"	.30
" chem. pure	"	.40

ANTIMONY—needle, lump lb. .04@.04¼

ARSENIC—white " .02¾@.03¼

Red, Outside brands	"	.06@.07
Saxony	"	.07½@.08

ASPHALTUM—

Barbadoes	per ton.	50.00@80.00
West Indies	"	20.00@60.00
Egyptian	lb.	.11@.16
Gilsonite, Utah ordinary	per ton.	32.00@40.00
Trinidad	"	20.00@25.00
California	per ton.	25.00@30.00

BARIUM—

Carb. Lump. 80@90%	lg. ton.	30.00@35.00
Precipitated, 96@98%	"	34.00@36.00
Powdered, 80@90%	lb.	.02@.02¼
Chloride com'l	ton.	35.00@38.00
Nitrate powdered, in casks	lb.	.05@.06½
Blanc Fixe, dry, bbl	per lb.	.02¼@.03½

BARYTES—

Am. Ground	sh. ton.	12.00@15.00
Floated	"	17.00@19.00
Foreign floated	"	20.00@23.00

BLEACHING POWDER—35% 100 lb 1.40@1.60

BLUE VITRIOL—(copper sulphate), carload, per 100 lb. 3.95@4.20

BONE ASH lb. .02¾@.04

BORAX, sacks " .04½@.05

CALCIUM—Acetate, gray, 100 lb. 1.85@1.92½

Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J. sh. ton. 65.00

Chloride, f.o.b. N. Y. " 11.00@14.10

CEMENT—

Portland, Am. 500 lb	bbl.	1.50@1.60
Foreign	"	2.25@2.90
"Rosendale," 300 lb.	"	.85
(in sacks)	"	.65
Slag cement	"	.75@1.25

CHROME ORE—

New Caledonia 50% ex. ship N. Y.	per lg. ton.	14.00@16.00
Bricks, f.o.b. Pittsburg, per M.		175.00

CLAY, CHINA—Am. common ex-dock, N. Y. ton. 7.00@10.00

Foreign " 10.00@17.50

COBALT—Oxide lb. 1.10@1.75

COPPERAS—Bulk 100 lb. $0.55

In bbls	"	.65@.80
In bags	"	.60@.75

CRYOLITE (carload) lb. .06@.07

FELDSPAR—Ground sh. ton. 12.50@14.00

FIRE BRICK—

American	per M.	30.00@40.00
Imported	"	30.00@45.00
St. Louis	"	16.00
Extra	"	20.00@23.00
Special extra	"	30.00@35.00

FIRE CLAY—F.o.b. St. Louis.

St. Louis, extra quality	per ton.	5.00
" ordinary	"	2.50

FLUORSPAR—

Domestic f.o.b. shipping port:		
Lump	lg. ton.	8.00@10.00
Ground	"	12.00@14.00
Foreign crude ex. dock		8.00@10.00

FULLER'S EARTH—Lump, 100 lb. .80@.85

Powdered " .80@.85

GRAPHITE—Ceylon.

Flying dust, finest to best	lb.	.02¼@.04
Dust	"	.02½@.05
Chip	"	.04@.08
Lump	"	.05½@.12
Large lump	"	.08¼@.10½

GYPSUM—

Fertilizer	sh. ton.	5.00
Ground	"	4.00@7.00

INFUSORIAL EARTH—

Ground Am. Best	lb.	.01¾@.02¼
German	"	.02¼@.02⅝

LEAD—Acetate (sugar of) brown, lb. .07¾@.08

Nitrate, com'l " .07⅞@.08½

MAGNESITE—Greece.

Crude (95%)	lg. ton.	7.50@8.50
Calcined, powdered	sh. ton.	26.00@37.00
Brick, domes, per qual. f.o.b. Pittsburg	M.	160@200

MAGNESIUM—

Chloride, com'l	100 lb.	.90@1.25
Sulphate (Epsom salt)	100 lb.	.90@1.00

MANGANESE—

Foreign, crude, powdered:		
70@75% binoxide	lb.	.01@.01¼
75@85% binoxide	"	.01¼@.01½
85@90% binoxide	"	.01½@.04
90@95% binoxide	"	.06½
Ore, 80%-85%	sh. ton.	16.00@32.50

MARBLE—Flour sh. ton. 8.50@9.00

MINERAL WOOL—

Slag, ordinary	sh. ton.	19.00
Selected	"	25.00
Rock, ordinary	"	32.00

MONAZITE SAND—

Guar. 97%, with 5% Thorium oxide, normal	lb.	.08 and up

NICKEL—

Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb.	.09@.11
Sulphate, double	"	.06½@.08

NITRATE OF SODA—

100 lb. 95%	2.10
95% for 1910	2.10
96% is 2½@7½c. higher per 100 lb.	

OZOKERITE—best lb. .14@.17

PAINTS AND COLORS—

Litharge, Am. powdered	lb.	.05½@.06¼
English glassmakers'	"	.08¼@.09¼
Lithopone	"	.03½@.07
Metallic, brown	sh. ton	16.50@22.00
Red	"	14.00@18.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02¾@.03
French, washed	"	.01¼@.02
Paris green, pure, bulk	"	.17½@.20½
Red lead, American	"	.06@.06½
Foreign	"	.08¼@.09¼
Turpentine, spirits bbl., per gal.		.60@.61½
White lead, Am., dry	lb.	.05¾@.05¾
American, in oil	"	.06½@.07
Foreign, in oil	"	.09½@.09¾
Zinc white, Am. extra dry	"	.05½@.05¾
French, proc's, red seal, dry	"	.06¾@.07½
French, process, green seal, dry	"	.07¼@.10¼

PHOSPHATES—Acid .55@60c. per unit

*Fla., hard rock 77%	6.50@9.00
land pebble 68%	3.75@4.00
†Tenn., 78@80%	5.00@5.50
75%	4.75@5.00
68@72%	4.25@4.50
‡So. Car. land rock 60%	3.50@4.00

*F.o.b. Florida or Georgia ports. †F.o.b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

POTASSIUM—

Bicarbonate crystal	lb.	$.07½
Powdered or granulated	"	.08
Bichromate, Am.	"	.07⅞@.08
Scotch	"	.10¾
Bromide	"	.20
Carbonate (80@85%)	"	.03⅝@.04
Caustic, ordinary	"	.06½@.06⅝
Elect. (90% KOH)	"	.06
Chloride (muriate), 100 lb		1.90
Chlorate, powdered	"	.09½@.09¾
Crystals	"	.09@.09½
Cyanide (98@99%)		
Carloads (30,000 lb.)	"	18c.
5-ton lots		18½c.
Less than 5 tons		.20@.22½
Kainite, long ton, bulk, 8.50; bags,		9.50
Permanganate	lb.	.09¼@.10½
Prussiate, yellow	"	.13@.13½
Red	"	.30@.33
Sulphate (basis 90%)	100 lb.	2.18@2.21

PYRITE—

Domestic, non-arsenical, furnace size, f.o.b. mines	per unit.	11@11½c.
Domestic, non-arsenical, fines, per unit, f.o.b. mines		10@10½c.
Imported, non-arsenical, furnace size, ex-ship, per unit		.12@.12½
Imported, arsenical, furnace size, ex-ship, per unit		.11½@.12
Imported fines, arsenical, ex-ship, per unit		.09
Imported fines, non-arsenical, ex-ship, per unit		10½@11c.

Pyrite prices are per unit of sulphur. A deduction of 25c. per ton is made when ore for furnace is delivered in large lumps.

SALT—N. Y. com. fine 280 lb. bbl. .72@1.13

N. Y. agricultural sh. ton. 3.80@4.50

SALTPETER—Crude 100 lb. 4.00@4.50

Refined, crystals " 5.50@7.00

SILICA—

Ground quartz, ord'ry.	lg. ton.	10.00@15.00
Silex, ground	"	13.00@15.00
Silex, floated	"	35.00@40.00
Lump quartz	"	5.00@5.50
Glass sand	"	2.75

SILVER—Nitrate, crystals oz. .33½@.36¾

SODIUM—Acetate lb. .04½@.05

"Alkali," per 100 lb., 58/48		.80@.87½
Bicarb. soda, per 100 lb		1.00@1.30
Soda, caustic, per 100 lb., 78/60		1.80@2.00
Soda, caustic, powdered		.02½@.03
Salt cake, per 100 lb., bulk		.40 up
Salt cake, bbl		.65@.85
Soda, monohydrate, per lb.		1.40@1.75
Bichromate	lb.	.05¼@.06½
Bromide	"	.20
Chlorate, com'l	"	.08½@.09½
Cyanide ("100% KCN")		
Carloads (30,000 lb.)	"	18c.
5-ton lots	"	18½c.
Less than 5 tons	"	19c.
Hyposulphite, Am.	"	1.30@1.50
Phosphate	100 lb.	2.20@2.50
Prussiate	"	.08½@.09
Sal soda, f.o.b. N. Y.	"	.65@.75
Foreign, f.o.b. N. Y.	"	.80@1.00
Silicate, com'l	"	.65@1.00
Sulphate, com'l (Glauber's salt)	100 lb.	.60@.80
Sulphate, com'l, calcined		.65@.85

STRONTIUM—Nitrate lb. .07½@.08

SULPHUR—Louisiana (prime) to New York lg. ton. 22.00 up

To Boston, Philadelphia or Baltimore	"	22.50 up
Roll	100 lb.	1.85@2.15
Flour	"	2.00@2.40
Flowers, sublimed	"	2.20@2.60
Sicilian, extra qual., unmixed seconds, crude brimstone to New York	lg. ton.	$22.00
Other ports	"	22.50

TERRA ALBA—Fr. & Eng. 100 lb. .80@1.00

TALC—Domestic sh. ton. 15.00@20.00

French	"	18.00@25.00
Italian, best	"	30.00@40.00

TIN—Bi-chloride, 50% lb. .09½

Crystals	"	.21½@.22½
Oxide, lb.	"	.32½@.35

URANIUM—Oxide " 3.50@4.25

ZINC—Chloride sol., com. 20° " .02¼

Chloride, granular	"	.04½
Dust	"	.06¾
Sulphate	"	.02¼@.02½

NOTE—These quotations are for ordinary wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. In the cases of some of the important minerals, such as phosphate rock, pyrites and sulphur, in which there are well established markets, the quotations fully represent the latter. But in the cases of some of the minor mineral products, the quotations represent what dealers ask of consumers and not what producers can realize in selling their output as matters of private contract.

THE MINING INDEX

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